इंटरनेट मानक

Disclosure to Promote the Right To Information

Whereas the Parliament of India has set out to provide a practical regime of right to information for citizens to secure access to information under the control of public authorities, in order to promote transparency and accountability in the working of every public authority, and whereas the attached publication of the Bureau of Indian Standards is of particular interest to the public, particularly disadvantaged communities and those engaged in the pursuit of education and knowledge, the attached public safety standard is made available to promote the timely dissemination of this information in an accurate manner to the public.

"जानने का अधिकार, जीने का अधिकार"
Mazdoor Kisan Shakti Sangathan
"The Right to Information, The Right to Live"

"पुराने को छोड नये के तरफ"
Jawaharlal Nehru
"Step Out From the Old to the New"

IS 15838-1 to 10 (2008): Mining - Glossary of terms (Amalgamating of IS 4791 : 1968, IS 4792 : 1968, IS 4863 :1968, IS 5028 l 1969, IS 5307 : 1968, IS 5767 : 1970, IS 5768 : 1970, IS 5814 : 1970, IS 5940 : 1979 AND IS 7580 : 1975) [MED 8: Mining Techniques and Equipment]

"ज्ञान से एक नये भारत का निर्माण"
Satyanarayan Gangaram Pitroda
"Invent a New India Using Knowledge"

Act Number 22 of 2005
The Indian Parliament
RIGHT TO INFORMATION

Made Available By
Public.Resource.Org

"ज्ञान एक ऐसा खजाना है जो कभी चुराया नहीं जा सकता है"
Bhartṛhari—Nītiśatakam
"Knowledge is such a treasure which cannot be stolen"

BLANK PAGE

BRUTUM FULMEN

IGNORANTIA JURIS NON EXCUSAT

PROTECTED BY COPYRIGHT

IS 15838 (Parts 1 to 10) : 2008
[Amalgamating of IS 4791 : 1968, IS 4792 : 1968,
IS 4863 : 1968, IS 5028 : 1969, IS 5307 : 1969,
IS 5767 : 1970, IS 5768 : 1970, IS 5814 : 1970,
IS 5940 : 1970 and IS 7580 : 1975]

भारतीय मानक

खनन — पारिभाषित शब्दावली

Indian Standard

MINING — GLOSSARY OF TERMS

ICS 01.040.73

© BIS 2008

BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

December 2008

Price Group 16

Mining Techniques and Equipment Sectional Committee, MED 08

FOREWORD

This Indian Standard (Parts 1 to 10) was adopted by the Bureau of Indian Standards, after the draft finalized by the Mining Techniques and Equipment Sectional Committee had been approved by the Mechanical Engineering Division Council.

Glossary of mining terms was first issued as different standards application-wise based on BS 3618 series of standards. The Committee responsible for formulation of these standards has decided to bring all the standards on glossary of mining terms as single standard with application-wise parts. Accordingly, glossary of the mining terms is issued as a single standard for the convenience of the users.

This standard supersedes the following standards:

Superseded Standard		*Base Standard*
IS 4791 : 1968	Glossary of mining terms (drainage)	BS 3618: Section 4 : 1963 Glossary of mining terms, Section 4 Drainage
IS 4792 : 1968	Glossary of mining terms (ventilation)	BS 3618: Section 2 : 1963 Glossary of mining terms, Section 2 Ventilation
IS 4863 : 1968	Glossary of mining terms (drilling and blasting)	BS 3618: Section 6 : 1964 Glossary of mining terms, Section 6 Drilling and blasting
IS 5028 : 1969	Glossary of mining terms (planning and surveying)	BS 3618: Section 1 : 1963 Glossary of, mining terms, Section 1 Planning and surveying
IS 5307 : 1969	Glossary of mining terms (boring and exploration)	BS 3618: Section 3 : 1973 Glossary of mining terms, Section 3 Boring and exploration
IS 5767 : 1970	Glossary of mining terms (strata control)	BS 3618: Section 11 : 1967 Glossary of mining terms, Section 11 Strata control
IS 5768 : 1970	Glossary of mining terms (winning and working)	BS 3618: Section 8 : 1964 Glossary of mining terms, Section 8 Winning and working
IS 5814 : 1970	Glossary of mining terms (shaft and associated equipment)	BS 3618: Section 9 : 1974 Glossary of mining terms, Section 9 Shafts and associated equipment
IS 5940 : 1970	Glossary of mining terms (geology)	BS 3618: Section 5 : 1964 Glossary of mining terms, Section 5 Geology
IS 7580 : 1975	Glossary of mining terms (transport)	BS 3618: Section 10 : 1967 Glossary of mining terms, Section 10 Transport

This revision has been taken up to update the terms, wherever found necessary. In the formulation of this glossary the object has been to standardize and to co-ordinate the technical terms in current use in the mining industry.

Only the terms which have a specified meaning in mining have been included in this standard and the terms which are common to most branches of engineering have been generally omitted.

The composition of the Committee responsible for the formulation of this standard is given in Annex A

Indian Standard

MINING — GLOSSARY OF TERMS

PART 1 DRAINAGE

1 SCOPE

This standard (Part 1) covers the definition of terms used in mining industry in connection with drainage.

2 TERMS AND DEFINITIONS

2.1 Adit — A horizontal or nearly horizontal passage giving access to the mineral deposit and driven for ventilation, drainage or transport of men, material or mineral.

2.2 Air Displacement Pump (Displacement Pump) — A pump consisting of a closed vessel from which water is expelled through a delivery valve and pipe by means of compressed air admitted to the top of the vessel.

2.3 Air Lift Pump — A means of raising water by admitting compressed air near the lower end of a submerged pipe column, thus lowering the specific gravity of the fluid in the pipe as compared with the water outside the pipe.

2.4 Angus Smith Compound — A protective coating for valves, fittings and pipes used for underground work, composed of coal-tar, tallow, resin and quicklime.

2.5 Aquiclude — *See* Confining Bed.

2.6 Aquifer — A porous water-bearing stratum.

2.7 Automatic Pump Control — The starting and stopping of a pump by a mechanism actuated by the level of water in the suction well or discharge tank.

2.8 Bailer

a) *See* Water Barrel.

b) *See also* Boring and Exploration section.

2.9 Barrel — *See* Water Barrel.

2.10 Bleed (Bleeder) — A small feeder of water issuing either naturally from the strata, or from a range of pipes.

NOTE — The bleed from a pipe may also be called a leak.

2.11 Bleeder — *See* Bleed.

2.12 Borehole Pump — Any pump which can operate in borehole, either shaft driven from the surface or electrically-driven by submersible electric motor.

2.13 Bulkhead — A water-tight dam containing some form of door or removable plate.

2.14 Bulkhead Door — A water-tight strong door or removable plate which is fitted to a dam and is provided as safeguard against sudden influx of water.

2.15 By-Pass Valve — A valve fitted in a pipe which provides a connection between the inlet and outlet of a piece of apparatus.

2.16 Cautionary Zone — A zone in which any unworked mineral lies within a specified distance from unconsolidated deposits or other source of danger, particularly water.

2.17 Cementation (Cement Grouting) — Grouting by the injection of cement or cement-clay suspension.

2.18 Cement Grouting — *See* Cementation.

2.19 Centrifugal Pump — A form of pump in which water is drawn through the eye of a rotating impeller and discharged from its periphery into a chamber or series of passages of gradually increasing cross-section. The kinetic energy given to the water by its centrifugal discharge is thus largely converted to pressure energy (*see also* Turbine Pump).

2.20 Check Valve — *See* Reflux Valve.

2.21 Check Valve (Flap Valve) — A hinged valve.

2.22 Clay Dam — A dam, wherein the seal against water is provided by puddled clay between brick walls or wooden planks.

2.23 Cleat — Two pieces of wood or steel bolted around a pipe to stop a leak.

2.24 Column (Delivery Column) — A length of pipe such as a shaft rising main, carrying water from the mine pumps to the surface.

2.25 Cone of Depression — The space enclosed between the water table, at which water would stand naturally in the ground, and the position at which it in fact stands owing to drainage or pumping at some point in the vicinity. In the case of confined water under pressure, the cone of depression in the space between the undistributed piezometric surface (q.v.) and the piezometric surface after pumping.

1—154 BIS/ND/08

2.26 Confining Bed (Aquiclude) — An impervious stratum above and/or below an aquifer.

2.27 Connate Water — Inherent water contemporary with the rocks containing it, as opposed to water subsequently permeating the rocks.

2.28 Dam — A seal constructed in a mine working to prevent or restrict the entry of foul air, noxious gases or water into mine working.

2.29 Dam (Plug) — A seal constructed in a mine roadway to prevent or control the entry of water into mine workings (of bulk-head).

2.30 Deepwell Pump — Any kind of pump delivering from a well, shaft or borehole.

2.31 Delivery Column — *See* Rising Main.

2.32 Delivery Drift (Offtake Drift, Jackhead) — A drift or adit connected to a shaft from a point on the surface at a lower level than the shaft top and used as an outlet into which mine pumps discharge, so reducing the height through which the water must be lifted.

2.33 Delivery Valve

a) Usually a valve at the outlet of a delivery pipe.

b) The sluice valve between a pump and its delivery pipe or delivery column.

c) The outlet valve forming part of a reciprocating pump.

2.34 Depressed Water Level (Pumping Water Level) — The lowest level of ground water during drainage or pumping.

2.35 Displacement Pump — *See* Air Displacement Pump.

2.36 Drainage Adit — An adit driven specifically for drainage of water (*see also* Adit).

2.37 Drainage Apparatus — An apparatus for boring towards old working or water-bearing strata, providing for control of water or gas which may issue therefrom at any time. A well-known apparatus of this type is the Burnside Boring Apparatus.

2.38 Drainage Tunnel — A tunnel driven specifically for drainage of water.

2.39 Drawndown — The vertical distance, at any point, through which the free ground water table or the undisturbed piezometric surface is lowered due to pumping.

2.40 Dredge Sump — *See* Settling Pit.

2.41 Drift — A draft or adit connected to a shaft from a point on the surface at a lower level than the shaft top and used as an outlet into which mine pumps discharge so reducing the height through which the water must be lifted.

2.42 Drowned Level (Inverted Siphon) — Part of a drainage drift which, being below both discharge and entry levels, is constantly full of water.

2.43 Duck Foot Bend — *See* Duck Foot.

2.44 Duck Foot (Duck Foot Bend) — A pipe bend at the bottom of a shaft column or rising main fitted with a horizontal base sufficiently strong for the weight of the rising main to rest upon it.

2.45 Feeder — Any flow of water or gas entering a mine.

2.46 Flank Bore — *See* Flank Hole.

2.47 Flank Hole (Flank Bore, Flanking Hole) — A borehole to detect water gas, or other danger, driven from the side of an underground excavation in a line not parallel with the center line of the excavation.

2.48 Flanking Hole — *See* Flank Hole.

2.49 Flap Valve — *See* Check Valve.

2.50 Flume (Launder, Race, Sluice) — An open trough or channel, made of wood or other material, used for conveying water.

2.51 Flush — Any sudden influx of water or other material into underground workings.

2.52 Foot Valve

a) A non-return valve immediately above the strainer in a pumping installation (*see* Suction Valve).

b) The non-return valve fitted to the inlet of a suction pipe.

2.53 Frame Dam — A stopping, dam or bulkhead built of heavy timbers.

2.54 Garland (Water Garland, Water Curb, Water Ring) — A channel fixed round the lining within a shaft in order to catch the water draining down the shaft walls and conduct it by pipes or water boxes to a lower level.

2.55 Gate Valve — A valve which provides a straight through passage for the flow of fluid.

2.56 Ground Water (Hydrology) — That aspect of hydrology which is concerned with the physical and chemical characteristics of water and similar liquids found in the ground.

2.57 Ground Water Level — *See* Water Table.

2.58 Ground Water (Meteoric Water) — Water penetrating from the surface and filling naturally the pores and fissures of the strata below the water table.

2.59 Grouting — The process of injecting cement, clay, hot bitumen, or other material, to improve the strength of the strata or to retard or prevent the passage of length or gases.

2.60 Growth — *See* Make of Water.

2.61 Highest Flood Level — The highest level at any point along the course of a river or other water course to which water has ever risen at that point during floods in the river or other water course.

2.62 Hydrology — The study of the movement of water above, on and within the earth's crust.

2.63 Inrush (Flush) — Any sudden flow of material and water into underground workings.

2.64 Inundation — Any flooding of workings with water or other liquid matter.

2.65 Inverted Siphon — *See* Drowned Level.

2.66 Jack Head — *See* Delivery Drift.

2.67 Launder — *See* Flame.

2.68 Lodge (Lodgement) — A reservoir of any size used for holding water in a mine. A sump or standage.

2.69 Lodgement — *See* Lodge.

2.70 Main Sump — Any excavation in a mine for collecting or storing water.

2.71 Make of Water (Growth) — The rate of entry of water into a mine or part of a mine.

2.72 Meteoric Water — *See* Ground Water.

2.73 Miner's Inch — *See* V-Notch.

2.74 Offtake Drift — *See* Delivery Drift.

2.75 On Air — The state of a pump which is operating although having no water in its working parts.

2.76 On Snore — The operation of a pump with its strainer partly exposed to air and passing a mixture of air and water.

2.77 Piestic Level — The level at which water in a confined aquifer will rise under its full hydrostatic head.

2.78 Piezometric Surface — An imaginary surface that coincides with the hydrostatic pressure level of the water in a confined aquifer.

2.79 Pipefitter — *See* Pipeman.

2.80 Pipeman (Pipefitter) — A man engaged in laying or repairing pipe lines.

2.81 Plug

a) *See* Dam.

b) A water-tight seal in a shaft formed by removing the lining and inserting a concrete dam, or by placing a plug of clay over ordinary debris used to fill the shaft up to the location of the plug.

2.82 Pumping Water Level — *See* Depressed Water Level.

2.83 Race — *See* Flume.

2.84 Reciprocating Pump — A pump depending for its action on the movement of a piston or plunger within a cylinder.

2.85 Reflux (Check Valve, Retaining Valve) — An automatic non-return valve, located on the delivery side of a pump, which opens freely to permit fluid to pass in one direction but closes under its own weight when motion ceases or when the fluid commences to flow in a reverse direction.

2.86 Rest Water Level — The level of the water table at any particular point. The level of water in a well or borehole when pumping is not in progress.

2.87 Retaining Valve — *See* Reflux Valve.

2.88 Rising Main (Delivery Column) — The pipe through which the water from a pump reaches the point of delivery, particularly the pipe column in a shaft.

2.89 Secondary Water — Water entering the mine from other workings, as opposed to water inherent in the area worked by the mine.

2.90 Settling Pit (Dredge Sump, Settling Sump) — An excavation through which mine water is conducted in order to reduce its velocity, thus allowing sediment to settle and to be cleaned out from time to time.

2.91 Settling Sump — *See* Settling Pit.

2.92 Shaft Plug — A water-tight seal in a shaft formed by inserting a concrete dam, or by placing a plug of clay or any other suitable material over ordinary debris used to fill the shaft up to the location of the plug.

2.93 Sinking Pump — A pump specially designed for use in sinking shafts.

2.94 Sliding Suction — A telescopic suction pipe.

2.95 Sluice — *See* Flame.

2.96 Sluice Valve — A valve consisting of a plate, moved by a screw between closely fitting channel guides.

2.97 Snorepiece (Strainer Strum) — A strainer fitted to the inlet of a suction pipe (*see also* Snore).

2.98 Spider — A ring inserted at the joints of the suspension column of a borehole pump, Radial vanes from the ring support a central sleeve which acts as a steady bearing for the pump shaft.

2.99 Standage

a) A water lodge.
b) The capacity of a sump or lodge.

2.100 Stanking — A water-tight stopping or bulkhead. The application of a waterproofing material to a stopping or bulkhead.

2.101 Static Head — The head produced by the static pressure of water.

2.102 Strainer — *See* Snorepiece.

2.103 Strum — *See* Snorepiece.

2.104 Submersible Pump — A pump driving unit which operates when fully submerged.

2.105 Suction Valve — The inlet valve forming part of a pump (*see also* Foot Valve).

2.106 Sump

a) That portion of the shaft below the normal winding level which is used for the collection of water for pumping.
b) Any excavation in a mine for collecting or storing water.

2.107 Swallow Hole — A natural cavern formed by the solution of rock, usually limestone, by water passing down a joint or bedding plane.

2.108 Tail of Water — The edge of water standing in mine working.

2.109 Tap — To hole or bore into old workings or water-bearing strata for the purpose of proving or extracting water or gas.

2.110 Tilting Disc Valve — A form of quick-closing reflux valve used with high lift pumps in order to minimize water hammer or closing usually pivoted on a diameter.

2.111 Turbine Pump — A multi-stage centrifugal pump fitted with stationary diffuser vanes on the outlet side of the impellers.

2.112 Valves — *See* under the following types of valve: by-pass, check, clack, delivery, flap, foot-gate, reflux retaining, sluice, suction, tilting disc.

2.113 V-Notch (Miner's Inch, Water Inch) — A device for measuring the flow of water in an open channel.

2.114 Water Barrel (Railer, Barrel) — A tank used for winding water from the sump at the bottom of a shaft; usually self filling by means of a valve or series of valve in the bottom of the tank.

2.115 Water Barrier — An area of solid mineral left unworked to protect a mine against entry of secondary water or water from overlying or underlying strata.

2.116 Water Blast — The explosion of water under pressure, in mine workings, caused by trapped air expanding as the water level is lowered.

2.117 Water Box — A rectangular wooden pipe used in shafts for conveying water between garlands.

2.118 Water Curb — *See* Garland.

2.119 Water Garland — *See* Garland.

2.220 Water Hammer — The pressure rise caused by sudden acceleration, retardation or stopping of the flow in a conduit.

2.221 Water Inch — *See* V-Notch.

2.222 Water Lodge — A reservoir of any size used for holding water in a mine.

2.223 Water Plane — *See* Water Table.

2.224 Water Ring

a) A type of centrifugal exhauster attached to pumps which might have to operate on snore.
b) *See* Garland.

2.225 Water Seal — A water accumulation in a depression in an underground roadway or in a pipe, sufficient to form a seal.

2.226 Water Table (Ground Water Level, Water Plane) — The plane or surface below which fissures and pore-in the strata are naturally saturated with water.

2.227 Weeper — A small feeder of water.

Indian Standard

MINING — GLOSSARY OF TERMS

PART 2 VENTILATION

1 SCOPE

This standard (Part 2) covers the definition of terms used in mining industry in connection with ventilation.

2 TERMS AND DEFINITIONS

2.1 Aerodynamic Efficiency of Fan — The ratio of the actual total head to the input head of the fan. (Actual total head is equal to the input head minus hydraulic losses in the fan).

2.2 Afterdamp — The mixture of gases which remains in a mine after a fire or an explosion of firedamp or coal dust. It consists of carbon dioxide, water vapour, nitrogen, oxygen, carbon monoxide and other gases.

2.3 Air Adit — An adit driven for the purpose of ventilating a mine.

2.4 Air Blast — A strong rush of air through the workings, caused by an explosion, a movement of large masses of strata, an outburst of coal or by a movement of a body of water.

2.5 Airborne Dust Survey — The systematic measurement of the concentration of airborne dust and its quality for assessing hazard to health at selected points in the mine.

2.6 Air Crossing — A bridge (natural or constructed) at the crossing of two airways which allows air to be conducted along both roadways without significant leakage of air from one roadway to the other.

2.7 Air Current (Air Flow) — The flow of air ventilating the workings of a mine.

2.8 Air Door — A door erected in a roadway to prevent the passage of air (when doors are erected between an intake and a return airway they may be known as 'separation doors').

2.9 Air Drift (Ventilation Drift) — An air passage driven in a rock for ventilation purposes.

2.10 Air Duct (Air Pipe, Ventilation Ducting, Ducting) — Tubing which conducts air, usually from an auxiliary fan, to or from a point as required in the mine.

2.11 Air Gate — A gate road used principally for ventilation.

2.12 Air Hole (Ventilation Hole) — A small excavation or hole made to improve ventilation by communication with other workings or with the surface.

2.13 Air Horsepower — The rate at which energy is used in horsepower units, in moving air between two points.

2.14 Air Lock — A system of doors arranged to allow the passage of men, material and vehicles through it without permitting appreciable air flow.

2.15 Air Pipe — *See* 'Airduct'.

2.16 Air Shaft — A mine shaft the main purpose of which is ventilation.

2.17 Air Split — A separate ventilation circuit formed by dividing the main ventilation current *(see also* Split).

2.18 Airway — A passage used mainly for ventilation purposes.

2.19 Anemometer — An instrument for measuring air velocity.

2.20 Antitropal Ventilation — Ventilation by a current of air travelling in direction opposite to that of the flow of mineral.

2.21 Artificial Ventilation (Mechanical Ventilation) — The inducing of a flow of air through a mine or part of a mine by mechanical or other means.

2.22 Ascensional Ventilation — The arrangement of the ventilating currents so that the air rises through the working face.

2.23 Atkinson — A unit of resistance to air flow. It is the resistance which absorbs a pressure of 4.89 kgf/m^2 when a quantity of 30 m^3/s of standard air is passing.

2.24 Automatic Doors — Ventilation doors on a haulage road that are automatically operated by passing vehicle or train of tubs, or other means.

2.25 Auxiliary Fan — A fan used to ventilate a heading by part of an air current.

2.26 Axial-Flow Fan — A fan having a cylindrical casing in which the air enters and leaves the fan in a direction substantially parallel to its axis.

2.27 **Backing** — The action of a firedamp roof layer flowing uphill against the direction of air current.

2.28 **Backlash** — In an explosion, a blast induced in the direction opposite to that of the spread of the explosion.

2.29 **Blackdamp** — A mine atmosphere containing carbon dioxide and nitrogen in excess of the normal percentage in atmospheric air resulting in a deficiency of oxygen.

2.30 **Bleed Intake** — An intake which is a component of a system of controlled ventilation.

2.31 **Blind Heading** — *See* Dead End.

2.32 **Blower of Gas** — A discharge of gas, normally firedamp, under pressure from a hole or a fissure in the strata, which lasts for an appreciable time.

2.33 **Bonnet** — A protective cover for the gauges of a flame safety lamp.

2.34 **Booster Fan** — A fan located in a mine roadway to increase the ventilating pressure in the air split so as to increase the quantity of the air through that roadway; whole of the air passing through the fan.

2.35 **Boundary Ventilation** — A ventilation system in which a number of downcast shafts arranged around the periphery of the working area are served by a common upcast shaft within the area, or *vice versa*.

2.36 **Brattice** — A light partition of temporary nature used in mine airways to course the air for ventilating the working places.

2.37 **Brush (Waft)** — To disperse an accumulation of firedamp by fanning the air by hand.

2.38 **Capacity Co-efficient of Fan** — The ratio of the actual total head of the fan to the Euler's head.

2.39 $\frac{\mathbf{CO}}{\mathbf{O_2\ Deficiency}}$ **Ratio,** $\frac{\mathbf{CO_2}}{\mathbf{O_2 Deficiency}}$ **Ratio,** $\frac{\mathbf{CO}}{\mathbf{CO_2}}$ **Ratio** — Volume ratios, derived from an analysis of a sample of an underground atmosphere, which give an indication of the rate of oxidation in an area.

2.40 **Casing** — *See* Fan Casing.

2.41 **Centrifugal Fan** — *See* Radial Flow Fan.

2.42 **Chokedamp** — Any mixture of gases in a mine which causes choking or suffocation.

2.43 **Coefficient of Friction of Airway** — The pressure absorbed per unit cross-sectional area and per unit rubbing surface of the airway for a unit rate of air-flow through it.

2.44 **Compound Ventilation System** — An arrangement of a number of major ventilation systems serving various large working areas and served by more than two shafts and their associated fans, but integrated to form one ventilation system. Usually adopted in large 'combined' mines.

2.45 **Contra-Rotating Fan** — An axial-flow fan having impeller rotating in opposite directions.

2.46 **Coursing**

a) To control the direction of the ventilation through the working.
b) To ventilate a number of faces in series.

2.47 **Davy Lamp** — A flame safety lamp invented by Sir Humphrey Davy.

2.48 **Dead End** — Dead end blind heading should be clearly defined. 'Dead end' means a face/abandoned working place underground where no airflow is available without artificial sourcing.

2.49 **Dead or Stagnant Air** — Air which has no perceptible movement.

2.50 **Door Attendant** — A person employed to operate an air door for the passage of traffic.

2.51 **Downcast Shaft** — A shaft through which fresh air is drawn or forced into the mine.

2.52 **Ducting** — *See* Air Duct.

2.53 **Dump Drift** — A passage leading from an airway to a point shaft some distance above an inset to allow the ventilating current to pass a station where skips or cages are loaded.

2.54 **Effective Temperature** — An arbitrary index of the degree of warmth or cold felt by the human body in response to temperature, humidity and movement of air and is the temperature of saturated air (air movement of 75 mm/s to 15 mm/s) which produces the same sensation to most human beings.

2.55 **Efficiency of Evasee** — The ratio of the static head recovered in the evasee to the useful dynamic head (difference between the dynamic heads at the fan outlet and the evasee outlet).

2.56 **Efficiency of the Mine Ventilation System** — The ratio of air power actually absorbed by all ventilating districts in the mine to the air power input to the mine (air power measured in the fan-drift).

2.57 **Equivalent Orifice** — A measure of the air resistance of a mine in terms of the area of a circular orifice in a thin plate which requires the same pressure difference when passing a certain quantity of air as that needed to circulate that quantity through the workings of the mine.

2.58 Euler's Head, Theoretical Head of Fan — It is defined by the relation:

$$He = \frac{u_2 v_{u2} - u_1 v_{u1}}{g}$$

where

u = peripheral velocity of impeller, and

v_u = tangential component of velocity of air leaving the impeller.

NOTE — Suffixes 1 and 2 refer to the impeller inlet and outlet respectively.

2.59 Evasee — An outlet passage of gradually increasing cross-sectional area leading from an exhaust fan.

2.60 Exhaust Ventilation — A system of ventilation in which the fan draws air through the workings by suction (*see also* Forced Ventilation).

2.61 Explosion-Proof Air-Crossing, Airbridge — A permanent explosion-proof structure constructed of fire-resistant materials used to permit two airways to cross each other with minimum leakage of air from one airway to the other.

2.62 Explosive Fringe — In a system where air (or other reactant gas) and a flammable gas are present, that region in which the two gases have mixed to produce a gas mixture capable of propagating explosion.

2.63 Explosive Limits — *See* Inflammable Limits.

2.64 Explosive Range — *See* Inflammable Range.

2.65 Fan Casing — Those stationary parts of a fan which house the impeller and guide vanes, if any, and guide air to and from the impeller.

2.66 Fan Drift (Ventilation Canal) — An airway loading from a mine shaft, or airway, to a fan.

2.67 Fan Eye — The central or intake opening of a radial flow fan/centrifugal fan.

2.68 Fan Shaft — The ventilation shaft to which a mine fan is connected. The spindle on which a fan impeller is mounted.

2.69 Fan Static Pressure — The difference between the fan total pressure and the fan velocity pressure.

2.70 Fan Total Pressure — The algebraic difference between the mean total pressure at the fan outlet and the mean total pressure at the fan inlet.

2.71 Fan Velocity Pressure — The velocity pressure corresponding to the average velocity at the fan outlet.

2.72 Feeder — Any flow of gas or water entering a mine.

2.73 Firedam, Fireseal — A barrier to seal off an area in which there is a fire.

2.74 Firedamp — A natural gas found in mines consisting mainly of methane or any explosive gas underground.

2.75 Firedamp Drainage Borehole — A borehole generally drilled at an angle through the rock strata mainly for the purpose of drainage of firedamp.

2.76 Fire Stink — The characteristic odour given off after the critical stage of spontaneous heating of coal or other combustible material has passed.

2.77 Flammable Fringe — In a system where air (or other reactant gas) and a flammable gas are present, that region in which the two gases have mixed to produce a gas mixture capable of propagating flame.

2.78 Forced Ventilation — A system of ventilation in which the fan forces fresh air through the workings under pressure (*see also* Exhaust Ventilation).

2.79 Gas — The term loosely applied to denote firedamp in coal mines.

2.80 Gas Detector — An apparatus or device to detect the presence of gas in mine air.

2.81 Gas Emission — The release of gas from the strata into the mine workings.

2.82 Gas Survey — The systematic measurement of the contents of a gas or gases present in the mine atmosphere at selected points (*see also* Ventilation Surveying).

2.83 Gauze — The wire mesh used to prevent the passage of flame from a flame safety lamp to the external atmosphere.

2.84 General Body of the Air — Mine atmosphere in the workings of a mine and includes the atmosphere in roof cavities and at roof level but excludes drill holes and sealed off areas of a mine.

2.85 Generalized Stone Dusting, Generalized Rockdusting — The application of stone dust or rockdust on the sides, roof and floor of all mine workings so that it overlays the deposited coaldust whereby the latter is prevented from being ignited or taking part in an explosion.

2.86 Geothermic Gradient — The rate of increase of rock temperature which increase in depth below the first constant temperature contour below the ground level.

2.87 Goaf, Gob, Waste — That part of the mine from which the mineral has been extracted and the space either filled with stowing dirt or allowed to cave.

2.88 Goaf Ventilation — *See* Waste Drainage.

2.89 Gob Stink — The characteristic odour given off during the advanced stage of spontaneous heating of coal or other combustible material (*see also* Fire Stink).

2.90 Head Coefficient of Fan — The ratio of the total head at the operating point (best efficiency point) of the fan to the Euler's head at zero capacity.

2.91 Homotropal Ventilation — Ventilation by a current of air travelling in the same direction as the flow of mineral.

2.92 Hurdle — A temporary screen or curtain to deflect the air upwards against the roof to disperse gas.

2.93 Inflammable Limits — The limits of concentration of combustible gas, vapour, or dust in air or oxygen between which the mixtures if ignited will just propagate a flame. They are usually expressed in terms of percentage by volume of gas or vapour or by weight of dust in dust-air mixture.

2.94 Inflammable Range — The range of combustible vapour, gas or dust air mixtures between the upper and lower flammable limits.

2.95 Ignition Temperature — The minimum temperature to which a substance whether solid, liquid or gaseous must be heated in order to initiate or cause self-sustained combustion independently of the heating or heated element.

2.96 Input Head of Fan — The ratio of the air power input to the fan to the weight of air input to the fan (air input to a fan is equal to air output plus air leakage in the fan).

2.97 Intake (Airway) — Any airway which carries the ventilating air into the mine and inbye.

2.98 Intake Shaft, Downcast Shaft — The shaft through which fresh air is forced or drawn into a mine.

2.99 Isogeotherm — A contour beneath the earth's surface through points which have the same mean temperature.

2.100 Isolation Stopping, Seal — The stopping used for the purpose of isolating or sealing off a fire area or worked out section in a mine from the rest of the mine workings and air currents.

2.101 Kata Kooling Power — A measure of the cooling power of the ambient air on human body as determined by the Kata thermometer.

2.102 Kata Thermometer — A type of instrument used to determine the cooling power of the ambient air as a result of the combined effect of temperature, humidity and velocity at a temperature of the instrument of 36.5°C which is the normal temperature of the human body, and sometimes to measure low air velocities.

2.103 Layering Number — A dimensionless number the value of which taken in conjunction with inclination, roughness, and whether the ventilation is ascensional or descensional, determines the mixing and movement of firedamp roof layers.

2.104 Layering of Firedamp — The formation of a layer of firedamp at the roof of a mine working and above the ventilating air current.

2.105 Leakage — An unintentional diversion of ventilating air from designed path.

2.106 Leakage Coefficient — A measure of the leakiness of any duct being the volume of air in m^3/min, which would leak from 30 m of the duct under a uniform pressure of 5 mm of water.

2.107 Limits of Inflammability — *See* Inflammability Limits.

2.108 Main Intake, Main Intake Airway — The airway which supplies fresh air to the main section or sections of a mine from the intake shaft or intake incline.

2.109 Main Return, Main Return Airway — The airway which conducts the vitiated air of a section or sections of a mine to the return shaft or return incline.

2.110 Mechanical Efficiency of Fan — The ratio of the air power input to the fan to the power input to the fan shaft. This takes into account mechanical losses due to bearing and disc friction.

2.111 Mechanical Ventilation — *See* Artificial Ventilation.

2.112 Methanometer — An instrument for determining the methane content in mine air.

2.113 Mine Air — The air circulating through the working of a mine.

2.114 Mine Fan (Mine Ventilator) — The main mechanical ventilator for the mine, normally situated at the surface.

2.115 Mixed Flow Fan — A fan in which the movement of the air is both axial and radial.

2.116 Motive Column — The height of a column of air of the same density as the air in the downcast shaft, which exerts a pressure equal to the ventilating pressure.

2.117 Naked Light (Open Light) — Any light which is not so enclosed and protected as to preclude the ignition of an ambient flammable firedamp air mixture.

2.118 Natural Air-Crossing — An air-crossing in which the two airways are separated by rock in its natural state.

2.119 Natural Ventilating Pressure — The ventilating pressure which produces natural ventilation.

2.120 Natural Ventilation — The natural flow of air which occurs in mine workings, usually due to differences in air density.

2.121 Noxious Gas — A gas which is injurious to health.

2.122 Open Light — *See* Naked Light.

2.123 Outburst (Gas) — Sudden violent discharges of gas of short duration, usually accompanied by the displacement of large quantities of mineral (most fine coal).

2.124 Overall Efficiency of the Ventilation System of a Mine — The ratio of air power actually absorbed by all ventilating districts in the mine to the power input to the fan drive. It is equal to the product of overall fan efficiency and the efficiency of the mine ventilation system.

2.125 Overall Fan Efficiency — The ratio of air horsepower to the horsepower absorbed by the driving motor of the fan.

2.126 Overcast — An air-crossing in which one airway is deflected to pass over the other.

2.127 Pilot Static Tube — A system of two concentric tubes used to measure the velocity head in conjunction with a manometer. It can also be used to measure total and static heads.

2.128 Pilot Tube — A tube used to measure the total head in conjunction with a manometer.

2.129 Pressure Chamber — An enclosed space arranged on the access side of a stopping, which seals off an area and is furnished with means of raising or lowering the air pressure within it.

2.130 Pressure Survey — The systematic measurement of air pressure at selected points in the mine or a ventilation system for the purpose of determining the pressure losses in different parts thereof.

2.131 Psychrometer — A hygrometer in which air is made to flow over the thermometer bulbs.

2.132 Quantity Survey — The systematic measurement of air quantity flowing at selected points in the mine or a ventilation system for the purpose of determining the air quantities reaching the working places and leakage losses.

2.133 Radial Flow Fan — A fan consisting of impeller with several blades or vanes rotating in a volute casing where air entering at the centre of impeller is given a rotary motion while being thrown towards the periphery.

2.134 Radial Ventilation — A ventilation system in which a number of downcast shafts arranged around the periphery of the working area are served by a common upcast shaft within the area, or *vice versa*.

2.135 Recirculation — The continuous circulation of the whole or a part of the same air in a part of mine ventilation system.

2.136 Regenerative Cooling — Process of utilizing heat which shall be absorbed in one part of the cycle to perform a useful function in another part of the cycle, by heat transfer.

2.137 Regulator — An adjustable opening specifically provided in a door or other ventilating device to control the ventilating air current passing through it.

2.138 Relighter Flame Safety Lamp — A locked spirit-burning flame safety lamp fitted with an internal relighting device.

2.139 Return Air — Air travelling in a return airway.

2.140 Return (Airway) — Any airway which carries the ventilating air outbye and out of the mine after it has ventilated the mine working or workings.

2.141 Return Shaft — *See* Ventilation Shaft.

2.142 Reversing Doors — The system of doors or shutters in a mine fan installation for reversing the direction of the air flow through the mine.

2.143 Roof Layer (Firedamp) — A layer of firedamp along the roof of mine working.

2.144 Rubbing Surface — The surface area of a given length of airway.

2.145 Safety Lamp — A locked flame lamp or electric lamp which is so enclosed and protected as to preclude the ignition of an ambient flammable firedamp air mixture.

2.146 Separation Door — *See* Air Door.

2.147 Series Ventilation — A system of ventilating a number of faces consecutively by the same air current.

2.148 Shaft Casing (Shaft Covering) — The structure enclosing the top of a shaft designed to prevent short circuiting of air into or out of the shaft.

2.149 Shut-Off Head of Fan — The head, theoretical or actual, developed by the fan at zero capacity.

2.150 Specific Speed of Fan — That speed of the fan which gives a unit capacity at a unit pressure at the best efficiency point of operation. It is given by the relation:

$$\eta_s = \frac{\eta Q^{1/2}}{H^{3/4}}$$

where

η_s = specific speed in rps,

Q = quantity in m^3/s, and

H = head in metres of air column.

2.151 Split

a) To divide the current into separate circuits to ventilate more than one section of the mine (*see also* Air Split).

b) Any division of branch of current.

c) The workings ventilated by the branch of the ventilating current.

2.152 Standard Air — Air with a density of 1.2 kg/m³. This is equivalent to dry air at a temperature of 21.1°C and a pressure of 760 mm of mercury.

2.153 Static Efficiency of Fan — The ratio of the air power output of the fan on the basis of static head to the power input to the fan shaft.

2.154 Static Pressure — The difference, in consistent units, between the absolute pressure at a point, and the absolute pressure of the ambient atmosphere. It is positive when the pressure at the point is above the ambient pressure and negative when below it. It is also the difference between the total pressure and the velocity pressure.

2.155 Static Tube — A tube used to measure the static head in conjunction with a manometer.

2.156 Stinkdamp — A miner's term for mine air containing hydrogen sulphide having a characteristic unpleasant odour of rotten eggs.

2.157 Stope Ventilation — Ventilation of the stope faces.

2.158 Stopping — A barrier constructed of brickwork, stone or other incombustible material.

2.159 Temperature and Humidity Survey — The systematic measurement of air temperature and humidity at selected points in the mine.

2.160 Theoretical Fan Pressure — The pressure that can be produced by a fan if there were no losses in it.

2.161 Total Efficiency of Fan — The ratio of the air power output of the fan (on the basis of total head) to the power input to the fan shaft. It is equal to the product of hydraulic efficiency, volumetric efficiency and mechanical efficiency of the fan.

2.162 Total Pressure — The algebraic sum of the static pressure velocity pressure at any particular point.

2.163 Toxic Gas — Any gas, which is poisonous, or having the ability to destroy life or health on contact or by absorption.

2.164 Tracer Gas — A gas introduced in small quantities into the main body of the air to determine either the quantity or direction of air flow or the leakage paths in the ventilating system.

2.165 Unit Ventilation — A system of ventilation in which each working face is ventilated by a separate air current.

2.166 Upcast Shaft — *See* Ventilation Shaft.

2.167 Vane Efficient of Fan — The ratio of the input head of the fan to the Euler's head.

2.168 Velocity Pressure — The pressure equivalent of the air velocity at any particular point.

2.169 Velometer — An instrument used for measuring the velocity of air on the 'spot'.

2.170 Ventilation — The process of supplying air by natural or mechanical means.

2.171 Ventilation Deducting — *See* Air Duct.

2.172 Ventilation Door — A door erected in a roadway to prevent the passage of air (when doors are erected between the main intake and the main return airway, they are known as 'separation doors').

2.173 Ventilation Drift — *See* Air Drift.

2.174 Ventilation Hole — *See* Air Hole.

2.175 Ventilating Pressure — The total pressure required to overcome the resistance to the flow of the ventilating air.

2.176 Ventilating Shaft — The shaft through which the vitiated air of the mine is carried or returned to the surface.

2.177 Ventilation Stopping — The stopping constructed between the intake and return airways to prevent the intake air from short-circuiting. It may be of temporary or permanent nature.

2.178 Ventilation Survey — Systematic observation of air pressure, quantity, velocity, humidity and temperature throughout a mine or part of a mine, to allow a detailed analysis of the ventilation system.

2.179 Venturi — Apparatus to induce a flow of air or gas in a duct by means of a jet of compressed air or water from a small nozzle in the duct.

2.180 Volumetric Efficiency — The ratio, expressed as a percentage, of the total volume of air fruitfully used in a mine to the total quantity of air circulated. It is usually taken to be the total quantity of air reaching the working faces compared with the total quantity entering the mine.

2.181 Volumetric Efficiency of Fan — The ratio of the actual air output to the air input to the fan.

2.182 Waft — *See* Brush.

2.183 Water Gauge

a) A measure of ventilating pressure, expressed in terms of the height of a column of water.
b) An instrument to measure the ventilating pressure difference.

2.184 Whitedamp — A miner's term for mine air containing a lethal percentage of carbon monoxide resulting from a coaldust or gas explosion and also in the gases given off in a mine fire.

Indian Standard

MINING — GLOSSARY OF TERMS

PART 3 DRILLING AND BLASTING

1 SCOPE

This standard (Part 3) covers the definition of terms used in mining industry in connection with drilling and blasting.

2 TERMS AND DEFINITIONS

SECTION 1 DRILLING

2.1 Terms Relating to Drilling

2.1.1 *Airleg* — A device, incorporating a pneumatic cylinder, providing support and thrust for a rock drill.

2.1.2 *Angle Shot* — *See* Cut-Off Shot (**2.2.33**).

2.1.3 *Chisel Bit* — A percussive drill bit having a single cutting edge.

2.1.4 *Collaring* — The operation of initial slow drilling for making a proper recess for the drill bit in the rock before drilling of a hole is commenced with full speed.

2.1.5 *Cruciform Bit* — A percussive drill bit having cutting edge intersecting in the form of a cross.

2.1.6 *Down-the-Hole Drill* — A percussive drill located immediately behind the drill bit in a rotary percussive drill.

2.1.7 *Drifter* — A heavy percussive drill requiring some form of rigid mounting.

2.1.8 *Drill Bit* — The end of a drill rod forming the cutting edge, which is either integral part of the rod or detachable cutting edge.

2.1.9 *Drill Boom* — An adjustable arm projecting from a drill carriage to carry a drill and hold it in position.

2.1.10 *Drill Carriage* — A vehicle on which one or more drill booms are mounted to permit the drills to be brought easily to their work site and to be removed before blasting (*see* also Jumbo).

2.1.11 *Drill Cradle* — The metal channel on which a heavy drill is fed forward as drilling proceeds.

2.1.12 *Drill Rig* — A device equipped with one or more drills with means to support and/or feed the drills. It may be stationary or mobile.

2.1.13 *Drill Rod, Drill Steel* — *See* 'Rod' and 'Stem'.

2.1.14 *Hammer Drill* — A percussive drill operated by compressed air.

2.1.15 *Jackhammer* — A light percussive drill used in the hand or with some light support.

2.1.16 *Jambo*

a) A drill carriage.

b) A mobile carriage with scaffold, carrying drills for drilling large size headings underground.

2.1.17 *Line Oiler* — A device for lubricating a drill by feeding oil gradually into the compressed air supply.

2.1.18 *Percussive Drilling* — A method of drilling whereby repeated blows are applied by the bit, while undergoing intermittent rotation.

2.1.19 *Rod* — A bar, the end of which is slotted, tapered or screwed for the attachment of a drill bit or a drill rod.

2.1.20 *Rotary Drilling* — A method of drilling in which rotation and thrust are applied to the bit, producing a continuous cutting action.

2.1.21 *Rotary-Percussive Drilling* — A method of drilling in which repeated blows are applied to the bit which is continually rotated under power.

2.1.22 *Scroll* — A helical projection on a drill rod or stem to remove the cutting from the hole.

2.1.23 *Shank* — The end of the drill rod or stem that engages with the chuck of the drilling machine.

2.1.24 *Stem* — A bar to the forged end of which is brazed a hard metal tip for drilling.

2.1.25 *Stoper* — A medium to light weight percussive drill requiring a suitable mounting for drilling upward in raises and overhead stopes.

2.1.26 *Tipped Bit* — A drill bit in which the cutting edge is made of specially hard material.

2.1.27 *Wagon Drill* — A drilling machine mounted on a light, wheeled carriage.

2.1.28 *Water Swivel* — A device by which flushing water can be fed into a hollow drill rod or stem as it rotates.

SECTION 2 BLASTING

2.2 Terms Relating to Blasting

2.2.1 *Air Blasting* — A method of blasting by means of a suitable device in which compressed air at very high pressure is piped to a steel shell in a shothole and discharged.

2.2.2 *ANFO* — An explosive mixture of ammonium nitrate and fuel oil (commonly diesel oil) used for blasting in quarries and tunnels underground.

2.2.3 *Backbreak* — The rock which is excavated outside the required dimensions, or 'neat lines', of a tunnel or sinking shaft.

2.2.4 *Base Charge* — A charge at the bottom of the detonator or a blasthole which is initiated by the primary charge.

2.2.5 *Battery* — A group of two or more primary cells or accumulators electrically connected in series or parallel to provide electric current.

2.2.6 *Bench* — A lower part of the face of a large excavation which is not advanced as part of the round but as a separate operation.

2.2.7 *Black Powder* — *See* Gun Powder.

2.2.8 *Blasting Gelatine* — A high explosive which is the most powerful of commercial explosives, taken as the standard of explosive power in many countries. It consists of guncotton and nitroglycerine.

2.2.9 *Blown-Out Shot* — A shot which has expanded its force outwards along the line of the shothole without any appreciable fragmentation around the shothole.

2.2.10 *Booster* — An explosive of special character, used in small quantities to initiate the blast of another explosive, which forms the main charge.

2.2.11 *Break Detector* — A tool used to detect breaks or fissures intersected by a shothole (usually combined with a scraper).

2.2.12 *Bulk Strength* — The strength of an explosive per unit volume expressed as a percentage of the value for blasting gelatine as a standard.

2.2.13 *Burden* — The least distance between an explosive charge and a defined free face which is a measure of the work to be done by the charge.

2.2.14 *Burn Cut* — A cut consisting of a cluster of shotholes placed close together, in different patterns drilled approximately at right angles to the face and parallel to each other, some holes remaining uncharged to provide free face (*see* Fig. 1).

2.2.15 *Bursting Time* — The total time interval between the first application or current to a detonator and its explosion.

2.2.16 *Cap Detonator* — A device for producing detonation in a high explosive charge, and initiated by a safety fuse or by electricity.

2.2.17 *Capped Fuse* — A safety fuse fitted to a detonator.

2.2.18 *Cardox* — A metal cylinder containing liquid carbon dioxide and a combustible to be ignited by an electric cap for vaporizing the liquid at a high pressure blasting the coal without flame.

2.2.19 *Cartridge* — An individual unit of explosive, usually wrapped in the form of a cylinder closed at both ends.

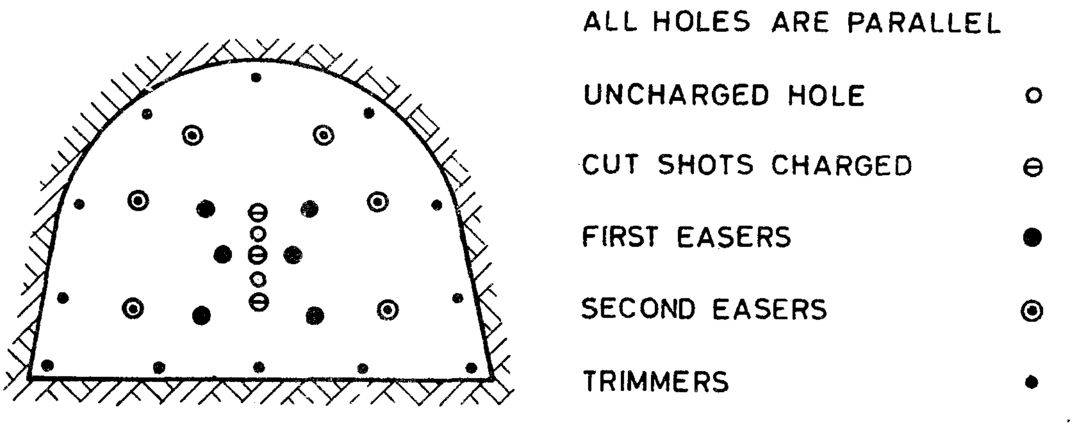


FIG. 1 BURN CUT

2.2.20 *Chamber* — An excavation to accommodate an explosive charge usually in the widened part of a blast hole.

2.2.21 *Chambering* — The operation of forming a chamber by special drilling techniques or by springing (*see also* Springing).

2.2.22 *Charge* — The quantity of explosives in a shothole.

2.2.23 *Churn Drill* — A percussive drill used for drilling in benches in quarries where a chisel is reciprocated by a rope, with an incorporated mechanism for turning the chisel bit after each stroke, causing 'Churning' in the hole.

2.2.24 *Circuit Tester* — An instrument used to test series circuits in electrical shot-firing for continuity and resistance.

2.2.25 *Column Charge* — A continuous charge in a quarry borehole (of deck charge).

2.2.26 *Cone Cut* — A cut in which a number of central holes are drilled towards a focal point and, when fired, break out a conical section of strata (*see* Fig. 2).

2.2.27 *Cooling Agent* — Chemical or chemicals added to an explosive during manufacture to suppress, quench or inhibit the flame and to reduce the temperature of gases produced during blasting.

2.2.28 *Coromant Cut* — A type of parallel hole cut (developed in Sweden) in which the uncharged central hole consists of two overlapping holes giving a slot in the form of figure of '8' roughly, to which the blasting holes can fire. In principle it is double spiral cut (*see* Fig. 3).

2.2.29 *Crimping* — The action of squeezing the open end of a plain detonator, or a detonating relay, over the end of a length of fuse or lead wire.

2.2.30 *Cuckoo Shot* — A shot fired in the roof of a longwall working, between the face and the waste, or in the waste.

2.2.31 *Cushion Blasting* — A method of blasting in which an air space is left between the explosive charge and the stemming, or in which the shothole is of substantially larger diameter than the cartridge.

2.2.32 *Cut* — The group of holes fired first in a round to provide additional free faces for the succeeding shots.

2.2.33 *Cut-Off Shot (Angle Shot)* — A shot in a delay round in which the charge has been wholly or partially exposed to atmosphere by reason of the detonation of an earlier shot in the round.

2.2.34 *Cut Shots (Sumpers)* — Shots which initially break ground to provide a free face for subsequent shots.

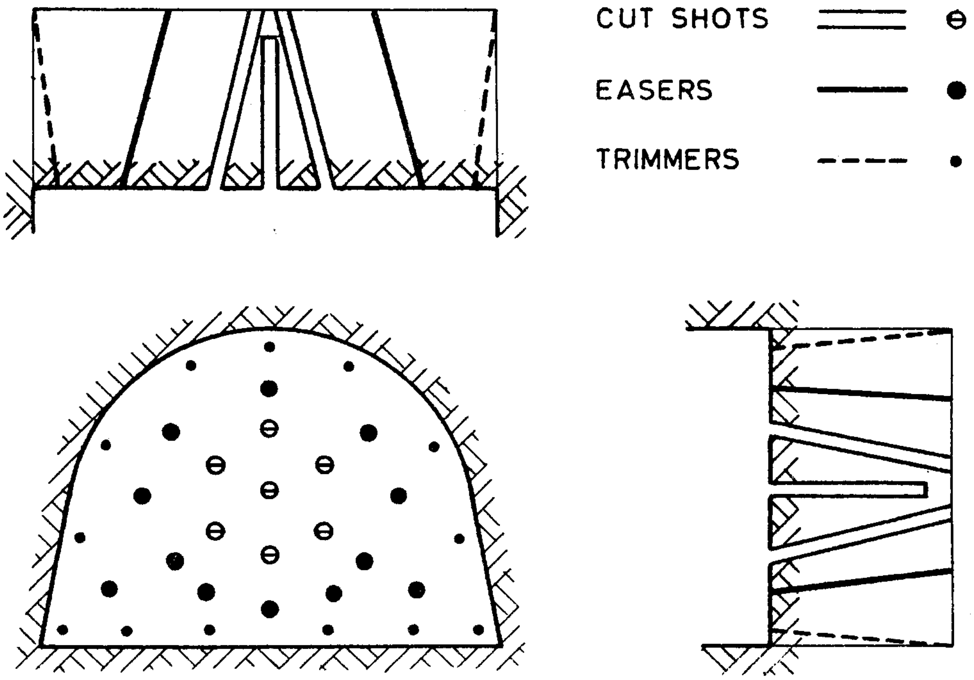


FIG. 2 CONE CUT

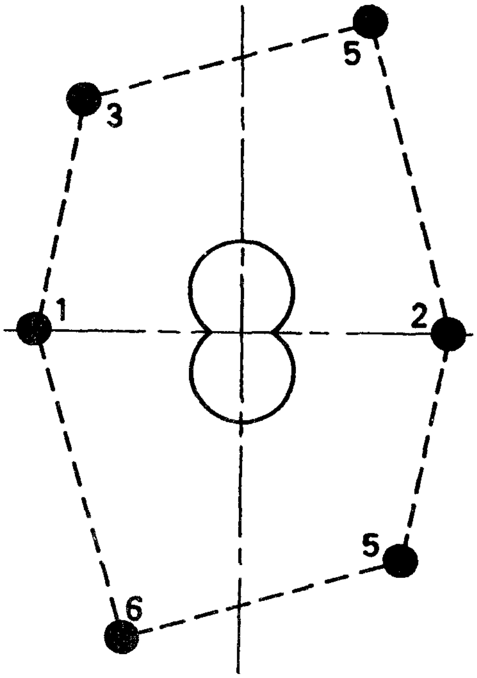


FIG. 3 COROMANT CUT

2.2.35 *Deck Charge* — A charge which is divided into several separate components along a quarry borehole (of column charge).

2.2.36 *Delay Detonator* — A detonator in which there is a designed interval of time between the application of an electric current to the detonator and its detonation.

2.2.37 *Delay Element* — That part of a delay detonator interposed between the fusehead and the priming charge to give designed delay between the application of an electric current to the detonator and its detonation.

2.2.38 *Delay Firing* — The firing of several shots in sequence, at designed intervals of time usually by means of delay detonators, detonating relays or sequence switches.

2.2.39 *Delay Interval* — The nominal period between the firing of successive delay detonators in a series of shots.

2.2.40 *Detonating Fuse* — A fuse containing a detonating explosive.

2.2.41 *Detonating Relay* — A device used intermediately in a detonating fuse circuit to obtain a short time delay.

2.2.42 *Detonation* — The almost instantaneous action of converting the chemicals in an explosive change to gases at a high pressure, by means of a high velocity self-propagating shock wave passing through the change.

2.2.43 *Detonator* — A device for producing detonation in a high explosive charge, and initiated by a safety fuse or by electricity.

2.2.44 *Diamond Cut* — *See* Pyramid Cut.

2.2.45 *Direct Initiation* — A method of blasting in which the primer cartridge is placed at the end of the explosive charge nearest the entrance to the shothole with the detonator facing towards the end of the shothole.

2.2.46 *Drag Cut* — A cut in which groups of holes are drilled at increasing heights above floor level and at increasing angles from the free face. The shots are fired to break out successive wedges of strata across the width of the face (*see* Fig. 4).

2.2.47 *Dynamite* — A general term relating to explosives in which the principal constituent nitroglycerine is contained within an absorbent substance.

2.2.48 *Easer* — Ring of holes drilled approximately concentrically around the cut holes and fired after cut holes.

2.2.49 *Equivalent-to-Sheathed Explosive* — An explosive incorporating intimately mixed cooling agents which is equivalent in safety in respect of ignition of methane/air mixture and/or coal dust on a charge weight basis to an explosive having a sheath of cooling agents surrounding the explosive.

2.2.50 *Excitation Time* — The minimum time for which electric current must flow in the fusehead of a detonator to ensure the ignition of the fusehead.

2.2.51 *Exploder* — A device having a small magnet generator actuated by hand or dry cell discharging through a condenser enough electrical current for the brief period necessary to fire electric detonated or detonators.

2.2.52 *Explosive Casting* — A system of blasting in opencast mines by which a major part of the overburden blasted from a bench or benches is cast over to the backfill, without the necessity of mechanical handling.

2.2.53 *Fan Cut* — A cut in which holes of equal or increasing length are drilled in the pattern of a fan to break out a considerable part of it before the rest of the round is fired; the holes are fired in succession in accordance with the increasing angle they form in relation to the face (*see* Fig. 5).

2.2.54 *Firing* — The process of initiating the action of an explosive charge or the operation of a mechanism which results in a blasting action.

2.2.55 *Flanking Hole* — A shothole drilled at an acute angle to the coal face for the purpose of trimming it.

2.2.56 *Foam Injection* — The injection of foam into shothole and connecting breaks to displace any firedamp present and to minimize further firedamp emission into the shotholes, thereby reducing the risk of ignition of the gas during shotfiring.

2.2.57 *Free Face* — A surface in the vicinity of a shothole of which the rock is free to move under the force of the explosion.

2.2.58 *Fuse* — *See* 'Detonating Fuse' and 'Safety Fuse'.

2.2.59 *Fusehead* — *See* 'Low Tension Detonator' and 'High Tension Fusehead'.

2.2.60 *Fuse Lighter (Igniter)* — A hand-held device for lighting safety fuse.

2.2.61 *Gelatines* — A general term relating to explosives in which a principal constituent (nitroglycerine) is given a gelationous consistency by mixing it with nitro-cotton.

2.2.62 *Gelignite* — A general term relating to explosives of the gelatine type in which there is proportion of woodmeal and oxygen-containing salts.

2.2.63 *Gunpowder* — A low explosive composed of sodium or potassium nitrate, charcoal and sulphur.

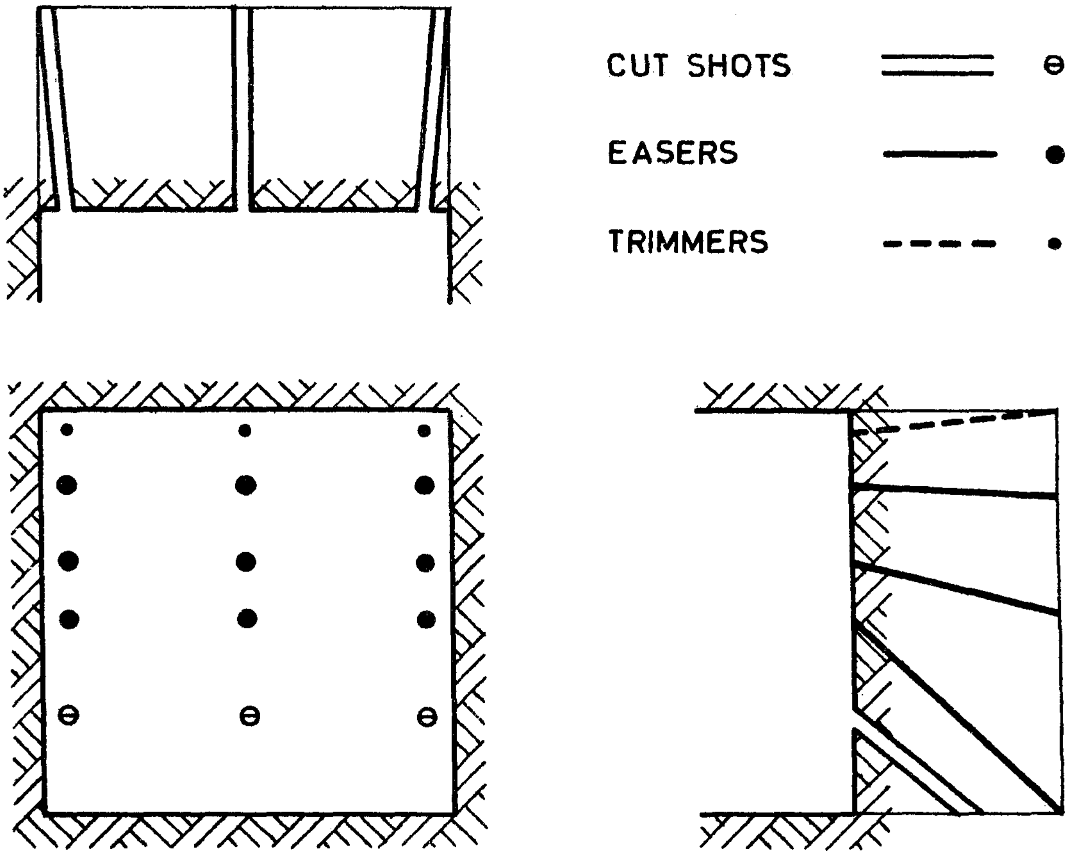
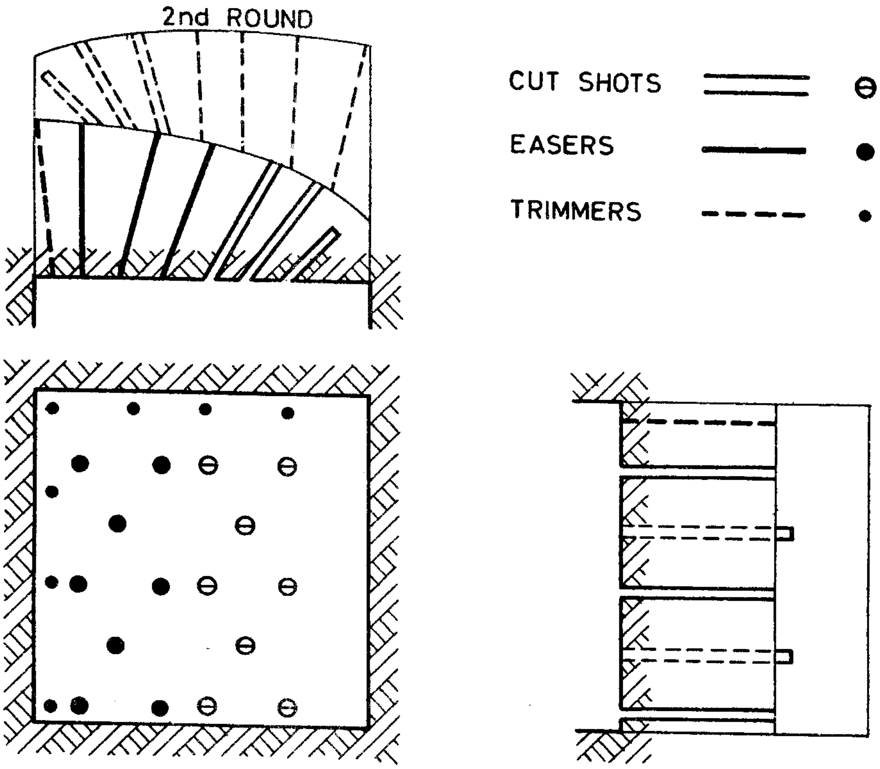
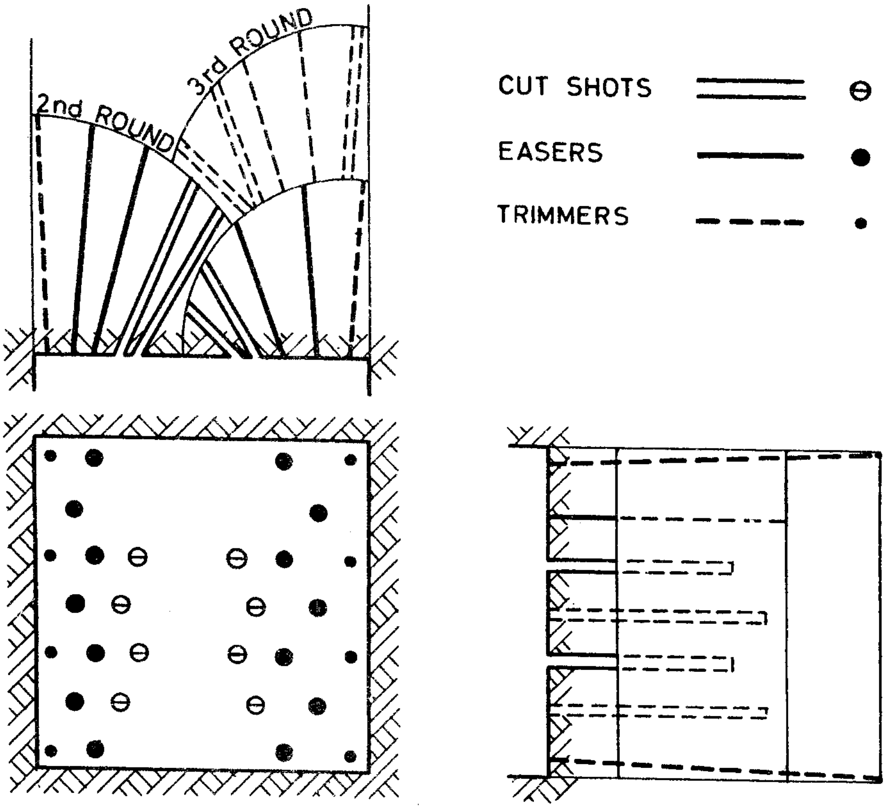


FIG. 4 DRAG CUT



FULL DRIVE



HALF DRIVE

Fig. 5 Fan Cut

2.2.64 *Heading Blast* — A quarry blast in which the explosive charge is located in one or more chambers excavated behind the quarry face.

2.2.65 *High Explosive* — An explosive which explodes with detonation and detonates at velocities varying from about 1 500 to 7 500 m/s, and produces large volume of gases at exceptionally high pressure.

2.2.66 *High Tension Detonator* — A detonator requiring an electrical potential of about 50 Volts for firing.

2.2.67 *Hydraulic Booster* — A hydraulic mechanism which when inserted into a large diameter shothole, breaks down the strata by means of pistons operating transversely.

2.2.68 *Hydrox* — A method of blasting using the discharge of chemically produced gases at a high pressure from a steel shell.

2.2.69 *Igniter Cord* — A cord which passes in intense flame along its length at a uniform rate to light safety fuses in succession.

2.2.70 *Indirect Initiation* — *See* Inverse Initiation.

2.2.71 *Induction Time* — The interval between the bursting and lag times of a detonator.

2.2.72 *Inert Primer* — A cylinder of inert material which enshrouds a detonator, but which does not interfere with the detonation of the explosive charge.

2.2.73 *Infusion Shotfiring* — *See* Pulsed Infusion Shotfiring.

2.2.74 *Instantaneous Detonator* — A detonator in which there is no designed delay period between the passage of an electric current through the detonator and its bursting.

2.2.75 *Inverse Initiation* — A method of blasting in which the detonator is placed at the end of the explosive charge farthest from the entrance to the shothole pointing towards the open head of the shothole.

2.2.76 *Jointing Sleeves* — A tube with insulating material used for jointing the wires in an electric blasting circuit to prevent current leakage under damp conditions.

2.2.77 *Lag Time* — The time between the initial application of current and the rupture of the circuit within the detonator.

2.2.78 *Leads* — The wires, forming part of an electric detonator, to which the shotfiring cable is connected.

2.2.79 *Licensed Store* — A place or building licensed under *Indian Explosives Act*, 1984, for the storage of explosives (*see also* Magazine and Registered Premises).

2.2.80 *Lifters* — Holes drilled at floor level.

2.2.81 *Low Density Explosive* — An explosive having a lower density compared with that of standard explosive such a blasting gelatine.

2.2.82 *Low Explosive* — An explosive which explodes merely by igniting it with a safety fuse without production of intense shock waves.

2.2.83 *Low Tension Detonator* — A detonator requiring minimum current of one ampere for firing and having a resistance of about 1 ohm. It has a low tension fusehead.

2.2.84 *Low Tension Fusehead* — That part of an electric detonator consisting of twin metal conductors bridged by fine resistance wire and surrounded by a head of igniting compound which burns when the firing current is passed through the bridge wire.

2.2.85 *Lox* — Liquid oxygen absorbed in a combustible absorbent which can be detonated only under confinement.

2.2.86 *Magazine* — A building for the storage of explosives licensed under *Indian Explosives Act*, 1884, to provide for circumstances where the more usual licensed store is inadequate or inappropriate (*see also* 'Licensed Store' and 'Registered Premises').

2.2.87 *Mains Firing* — The firing of a round of shots by means of current supplied from the mains.

2.2.88 *Millisecond Delay Detonator* — *See* Short-delay Detonator.

2.2.89 *Misfire* — A shot which has failed to explode.

2.2.90 *Muffle Blasting* — A system of blasting commonly practiced in open cast mines in populated areas in which a screen or some type of obstruction is placed over the shotholes immediately before firing the shots to prevent accidents from flying fragments of rocks.

2.2.91 *Multi-Shot Firing* — The action of firing several shotholes either simultaneously or by delay firing.

2.2.92 *Non-permitted Explosive* — An explosive which is not approved by statutory authority for use in gassy and dusty mines.

2.2.93 *Ordinary (Plain) Detonator* — A detonator for use with safety fuse.

2.2.94 *Overbreak* — *See* Backbreak.

2.2.95 *Parallel Firing* — The firing of detonators in a round of shots by dividing the total supply current between the individual detonators (*see* Series Firing).

2.2.96 *Permitted Explosive* — Explosive of a type which has been tested and approved by statutory authority for use in mines where there is a risk of ignition of firedamp and/or coal dust. (*See also* Normal Permitted Explosives; Sheathed Explosives; Equivalent-to-Sheathed Explosives).

2.2.97 *Plaster Shooting* — A form of secondary blasting in which explosive is detonated in contact with the rock without the use of a shothole.

2.2.98 *Pneumatic Loading* — The process of loading a powdered or palletized explosive into a shothole through a pneumatic hose.

2.2.99 *Pop Shooting* — A form of secondary blasting with the help of shallow shotholes.

2.2.100 *Pricker* — A non-sparking tool for making a hole in the primer cartridge to receive the detonator.

2.2.101 *Primer Cartridge* — The explosive cartridge into which the detonator has been inserted.

2.2.102 *Primer Charge* — A charge of more sensitive explosive placed in contact with a detonator to ensure detonation of the main charge.

2.2.103 *Priming Charge* — The charge in a detonator which is ignited by the fusehead.

2.2.104 *Pull* — The linear advance resulting from the firing of a round of shots.

2.2.105 *Pulsed Infusion Shotfiring* — A technique of shotfiring in which an explosive charge is fired in a shothole which is filled with water under pressure and in which the strata around the shothole have been infused with water.

2.2.106 *Pyramid Cut* — A cut in which four central holes are drilled converging to but not meeting at a point, and when fired break out a tetrahedral section of strata (*see* Fig. 6).

2.2.107 *Registered Premises* — Premises registered under *Indian Explosives Act*, 1884, for the storage of not more than 25 kg of explosive (*see also* 'Licensed Store' and Magazine').

2.2.108 *Relieving Shot* — A shot fired to dislodge or expose a misfire.

2.2.109 *Ripping* — The breaking down of the roof in mine roadways to increase the headroom for haulage, traffic and ventilation.

2.2.110 *Rotary Blasthole Drill* — A heavy duty rotary

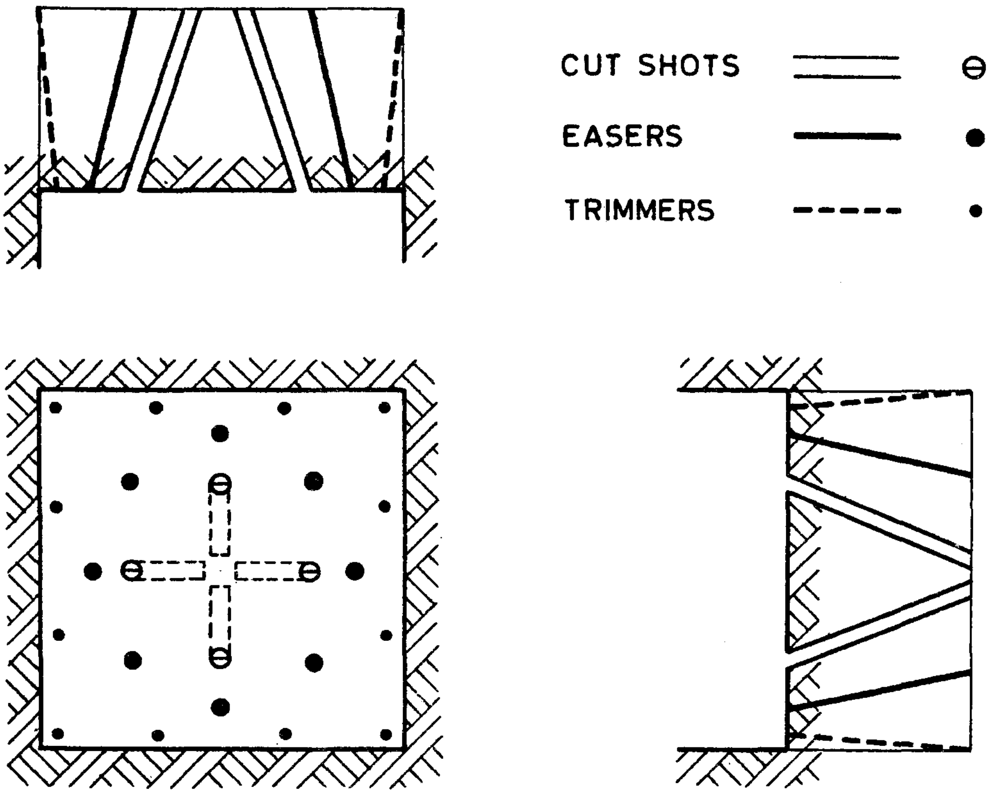


FIG. 6 PYRAMID CUT

drill used for drilling in benches of quarries with the cuttings removed from the hole by a blast of air.

2.2.111 *Round* — A number of shots intended to be fired either simultaneously or with delay periods between shots.

2.2.112 *Safety Fuse* — A fuse with a black powder core, having a prescribed covering and designed to burn at a specified speed.

2.2.113 *Scraper* — A tool designed to remove drill cuttings from a shothole before the insertion of the explosive charge (usually combined with a break detector).

2.2.114 *Secondary Blasting* — The use of explosive to break the rock already blasted into smaller pieces (*see also* 'Plaster Shooting' and 'Pop Shot').

2.2.115 *Series Firing* — The firing of detonators in a round of shots by passing the total supply current through each of the detonators (*see* Parallel Firing).

2.2.116 *Series Parallel Firing* — The firing of detonators in a round of shots by dividing the total supply current into branches, each containing a certain number of detonators connected in series.

2.2.117 *Sheathed Explosive* — A permitted explosive in which each cartridge is surrounded by a shealth of inert cooling material, such as sodium bicarbonate.

2.2.118 *Shell* — A steel tube from which air or other gas at high pressure is discharged with explosive force in a shothole (as used with cardox, hydrox and air blasting).

2.2.119 *Shooting Valve* — The control valve provided for the purpose of admitting compressed air to an air-blasting shell and of venting to atmosphere residual air, in the shell and hose.

2.2.120 *Short-Delay Detonator (Millisecond Delay Detonator)* — A detonator in which the interval of time delay is incremental in milliseconds.

2.2.121 *Shot* — An explosive charge contained within a shothole.

2.2.122 *Shotfiring* — The action of detonating or igniting a charge of explosive, usually in a drilled hole.

2.2.123 *Shothole* — A hole drilled for the purpose of shotfiring.

2.2.124 *Simultaneous Shotfiring* — The firing of a round of shots using instantaneous detonators.

2.2.125 *Socket* — The part of a shothole which remains unbroken after the firing of a shot.

2.2.126 *Springing* — A quarry blasting method in which a succession of charges is fired on a borehole to open up a chamber to accommodate a large charge for the final blasting.

2.2.127 *Squib* — A thin tube filled with gun powder, forming a slow burning fuse to explode a stemmed charge of gun powder.

2.2.128 *Stem* — To insert and pack stemming in a shothole.

2.2.129 *Stemming* — Inert material packed between the explosive charge and the outer end of the shothole, or between adjacent charges in deck charging.

2.2.130 *Stemming Rod* — A non-sparking rod used to push explosive cartridges into position in a shothole, and to ram right the stemming.

2.2.131 *Sumpors* — *See* Cut Shots.

2.2.132 *Tchisa (Cheesa) Stick* — *See* Fuse Lighter.

2.2.133 *Toe* — Unbroken rock lying at the foot of a quarry face.

2.2.134 *Toe Hole* — A horizontal or upwardly inclined shothole placed at the foot of a quarry face.

2.2.135 *Trimmers* — Shots, at the periphery of an excavation, fired to give the excavation its final outline.

2.2.136 *Tump* — *See* Stress.

2.2.137 *Tunnel Blast* — *See* Heading Blast.

2.2.138 *Velocity of Detonation (VOD)* — The velocity with which the shock wave traverses an explosive charge on detonation.

2.2.139 *Water Ampoule* — A fire-resistant plastics container filled with water used in stemming as a safety precaution in shotholes.

2.2.140 *Wedge Cut* — A cut in which the central holes are positioned to break out a wedge-shaped section of strata when fired (*see* Fig. 7).

2.2.141 *Weight Strength* — The strength of an explosive per unit weight, expressed as a percentage of the value of a standard explosive, such as blasting gelatine.

2.2.142 *Well Drill* — A percussive drill used for drilling in rocks where a heavy cutter is reciprocated by a rope.

2.2.143 *Wellhole Blast* — A method of quarry blasting in which the explosive charges are placed in rows of vertical holes. Deck charge is usually employed and a powerful gelatinous explosive is loaded at the bottom of the holes.

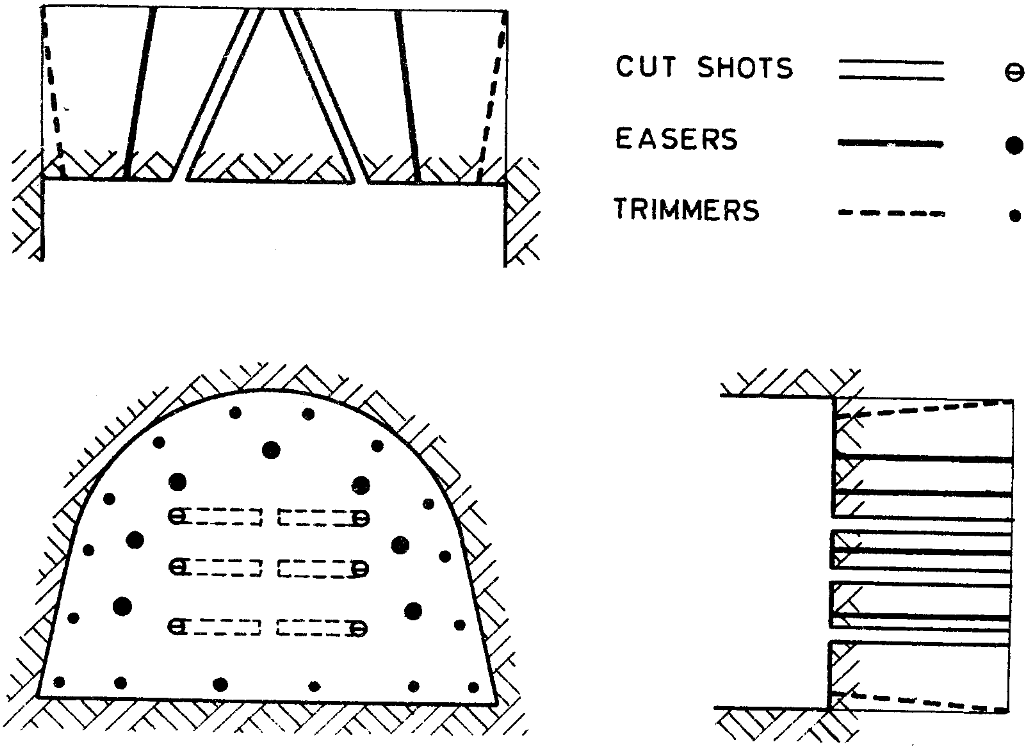


FIG. 7 WEDGE CUT

Indian Standard

MINING — GLOSSARY OF TERMS

PART 4 PLANNING AND SURVEYING

1 SCOPE

This standard (Part 4) covers the definition of terms used in mining industry in connection with planning and surveying.

2 TERMS AND DEFINITIONS

2.1 Abandonment Plans — Up-to-date plans, drawings and sections of the abandoned mines submitted to the concerned Government departments dealing with mines within the specified period of the abandonment of the mine.

2.2 Abney Level — A hand held instrument for measuring inclinations.

2.3 Anaglyph — A map so drawn in two colours that a three-dimensional picture is obtained when seen through a special viewing device.

2.4 Arbitrary Line — A reference line, the direction of which does not necessarily coincide with cardinal direction.

2.5 Assumed North — A direction assumed to be north for reference purposes.

2.6 Auxiliary Telescope — A telescope, fitted parallel to the main telescope of angle measuring instrument for measuring and setting out horizontal and vertical angle where the main telescope can not be used.

2.7 Azimuth of a Line — The angle measured clockwise from the northerly direction of the geographic meridian to the direction of the line.

2.8 Barrier — Mineral or ground left unworked so as to separate workings from each other or from a natural hazard.

2.9 Base Plate — A metal plate used to provide a stable measuring point of a temporary nature.

2.10 Borehole Map — A map prepared from holes usually drilled on a square grid pattern for investigation of a target mining area giving their number, hole collar elevation, thickness of overburden/waste and deposit, elevation of top/hanging wall or floor/foot wall of individual deposits.

2.11 Borehole Survey — A survey to obtain technical, geological, physical and mineralogical information above the strata intersected by a borehole. A survey to ascertain the amount and direction of deviation of axis of a borehole from the vertical.

2.12 Bore Journal — A tabular record of the characteristics and thicknesses of strata intresected by a borehole log.

2.13 Boundary — The limit of working of a mine.

2.14 Centre Line (Roadway) — A line marked on the roof of a roadway to indicate the direction of the central axis of the roadway.

2.15 Chainman/Rodman — An assistant to a surveyor.

2.16 Check Survey — A survey made to confirm the position of established survey stations and main roadways in the mine within prescribed limit of errors by law.

2.17 Compressed Air Distribution Plan — A plan showing the position and details of compressed air equipment and air lines in a mine.

2.18 Continuous Azimuth Method — A method of traversing by which the azimuth of the survey lines is obtained from the instrument.

2.19 Co-planning — The process of moving the head of a angle measuring instrument laterally until the vertical axes lies in the produced vertical plane common to two plumb lines.

2.20 Correlation — The process of establishing true relationship between surface and underground surveys with reference to National coal grid.

2.21 Density (of Seams) — An indication of the spacing of seams in the strata; the seam density is said to be high if the seams are close together, or low if they are widely separated. The ratio of the sum of the thickness of a number of adjacent seams to the thickness of an arbitrarily chosen sequence of strata.

2.22 Development Plan — A plan showing the proposed development of the mine workings, and kept for operational purposes.

2.23 Disused Workings — Workings which are no longer in operation but which are not classified as abandoned.

2.24 Double Setting — A levelling procedure whereby observations are duplicated by resetting the instrument to detect errors of measurement immediately.

2.25 Draft — A survey line in a traverse.

2.26 Dust Sampling Plan — A plan required by law, showing the zones in a mine from which samples of deposited dust are collected and the area of such deposited dust identified for their adequate treatment.

2.27 Easting — The easterly component of a national coal grid co-ordinates.

2.28 Electrical Plan — The plan required by law, which shows the required locations and information of cables, light fittings, telephones, large haulages, etc, on the master plan.

2.29 Electronic Distance Meter (EDM) — An electronic device capable of measuring distances quickly and accurately based on emission of the invisible infrared light pulses. The device can be mounted on a standard theodolite to facilitate angle measurement as well.

2.30 Electronic Theodolite Intersection System (ETIS) — Combination of two or more electronic theodolites linked to an online computer with associated hardware and suitable software, used for determination of non-contact three dimensional co-ordinates in real time with very high accuracy and suitable for monitoring the deformation of underground openings, slope hanging walls and slope stability.

2.31 Electronic Total Station (ETS) — A fully integrated electronic device capable of measuring distances, angles, automatic survey data recording and reducing them to three dimensional co-ordinates quickly and accurately. Setting out in the field can also be performed by the instrument.

2.32 Fire-Fighting Plan — A plan required by law, which shows location of mine workings of all water lines, taps, fire stations, pumping stations, ventilation system, escape routes, fire fighting equipments, fire proof zones, fire stoppings, compressed air lines, etc.

2.33 Floor Station — A survey station secured in the floor of a mine roadway or working face.

2.34 Geographic or True North — The northerly direction of the geographic meridian at any terrestrial point.

2.35 Geological Map — A plan prepared of an area on a suitable contour interval wherein different geological formations with their geological succession, structural features, other geological features and contour are indicated.

2.36 Global Positioning System (GPS) — An all weather and world wide satellite based system which provides three dimensional position accurately, used in open cast mines for excavation monitoring, vehicle tracking or dispatch system, Heavy Earth Moving Machinery control etc. It is used in various survey activities. However, it cannot be used in underground mines.

2.37 Grade Lines — Lines which define the intended grade of a roadway which is being driven (such lines are used to control the gradient of a roadway).

2.38 Gyroscopic (Meridian Indicator) — An instrument which indicates the direction of geographic/true north, using the properties of a rapidly rotating mass, one of whose axes is constrained by the earth's gravitational field (this instrument has been developed in its most precise form for application in correlation and true north determination).

2.39 Isoclinic Lines — Imaginary lines joining places on the earth's surface at which magnetic dip is same.

2.40 Isogonic Lines — Imaginary lines joining places on the earth's surface whose declinations are equal at any given time.

2.41 Isopachytes — Lines drawn on a map showing equal vertical thicknesses of a stratum or strata.

2.42 Lamp Cup — A means for supporting a flame safety lamp on a tripod to prove a sight for surveying.

2.43 Laser Indicator — A light projector with a laser device which forms a narrow directed beam of red light used for assigning the direction to the underground mine working.

2.44 Laser Profiler — An instrument based on pulse laser technology for measuring distances and three dimensional co-ordinates without any reflector to most types of surfaces including earth, coal rock and vegetation. It can be used in slope monitoring of an open cast mine benches and also in OB dumps monitoring.

2.45 Legend of Strata — A drawing which shows the sequence of strata.

2.46 Linesman — An assistant to a surveyor.

2.47 Loose-Needle Traversing — A method of traversing in which the magnetic bearings of survey lines are separately obtained by using a magnetic dial.

2.48 Magnetic Correlation — The orientation of an underground survey with respect to surface survey using a magnetic compass or dial.

2.49 Mask — A screen, usually made of tracing cloth, to subdue and diffuse the light behind a plumb line or other sighted object.

2.50 Mine Plan — The plan required by law, which shows all the current workings, disused or abandoned workings within a stipulated zone adjacent to the boundaries of the mine.

2.51 Miner's Dial — A surveying instrument for measuring and setting out angles, bearings and determined magnetic north.

2.52 Mine Surveyors — A surveyor recognized by laws, appointed and responsible for carrying out surveying and levelling works and preparation of plans. drawings and sections of a mine.

2.53 Mining Theodolite — A theodolite having particular features of a design which make it suitable as an underground surveying instrument.

2.54 National Coal Grid — A rectangular system of co-ordinates developed by Survey of India (SOI) for use in Indian coalfields based on Conformal Conic Projection System.

2.55 National Grid — A rectangular system of co-ordinates common to all parts of the country and used by SOI. The system is based upon the Lambers Conformal Coni Project with two standard parallels. (The grids and the maps on which the grids are superimposed are classified as restricted.)

2.56 Northing — Northerly component of a National Coal Grid Co-ordinates.

2.57 Optical Centring Device — An optical device which enables a theodolite to be accurately positioned over or under a survey station.

2.58 Optical Plummet — An optical device, survey instrument to be accurately positioned over or under a survey station.

2.59 Overlay Tracing — A tracing on which the workings in a seam shown. A series of such tracings allows the workings in several seam to be seen in their correct horizontal relationship.

2.60 Overman's District Plan — The plan required by law which shows the limits of each Overman's/Mining Sardar's district.

2.61 Pilot Bob — The weight attached to a shaft plumb line for the purpose of lowering the line down the shaft.

2.62 Project Plans — A series of plans of a proposed new mining project reconstruction which are drawn up for the purpose of examination and approval of the project.

2.63 Pumping Plan — A plan which shows, in addition to the workings of a mine and the seam contours, the position of pumps, dams and waterlogged areas.

2.64 Quarterly Survey — An underground survey required by law to be undertaken at least once every three months for the purpose of bringing the working plans and other plans up-to-date.

2.65 Reconstruction — Reorganization of the existing mine workings and facilities to improve its efficiency and/or increase output.

2.66 Rescue Plans — The sets of plans required by law which are suitable for use by rescue workers.

2.67 Reserves — Calculable tonnages including some that is believed even though not conclusively proved to exist within given boundaries. Depending on the degree of assurance of their existence, they are divided into proved, probable and possible reserves. Also described as workable, probable workable and unworkable reserves depending on the application of arbitrary limits in respect of depth, thickness, geological conditions and contemporary economic factors. Measured, indicated, and inferred reserves are other terms used in mine valuation work.

2.68 Roof Station — A survey station fixed in the roof of a mine roadway or working face.

2.69 Schmidt Apparatus — Apparatus used to determine the position of rest of a freely swinging shaft plumb line.

2.70 Seam Contour — A contour drawn on a plan joining points on the floor or top of a seam, which have the same level with reference to a prescribed datum.

2.71 Shaft Plumbing — The suspension of plumb lines in a shaft for the purpose of orientation or for shaft surveying.

2.72 Shaft Section — A drawing or log giving details of the structure and the nature of strata intersected by a shaft.

2.73 Shaft Survey — A detailed survey of vertical shafts in successive stages to determine misalignment or axial distortion and displacement of shaft walls due to rock pressure. A survey conducted to maintain verticality of shafts in course of sinking or to measure depths of shafts.

2.74 Spad — A means of marking an underground survey station, which consists of a flat spike with a drilled a hole for the suspending of a plumb line.

2.75 Stage Plumbing — A precise method of orienting underground workings in which plumb lines are transferred down a deep shaft in stages of 120-185 m. While shaft sinking is in progress, the lines can also be employed to orient the shaft itself and to keep it plumb.

2.76 Stone-Dust Plan — A plan maintained at the coal mines showing different zones into which the mine has divided for the purpose of treatment of coal dust with stone dust or any other incombustible material.

2.77 Straight Edge Levelling — A system of levelling using a straight edge and a spirit level in places which are too steep for the convenient use of conventional instruments.

2.78 Stretcher Bar — A telescopic bar used to support a survey instrument when the inclination of the roadway (and sometimes its width) does not permit the use of a tripod.

2.79 Subsidiary Survey — An underground survey made to determine the position of a face line or goaf line or some other specific feature.

2.80 Supplementary Plans — Plans which may be required by law to show in greater detail information not easily depicted on the working plans.

2.81 Surface Plan — A plan required by law, showing every surface features (natural and artificial) within the mine boundary.

2.82 Telescopic Dial — A miner's dial in which a telescope replaces the usual sighting vanes.

2.83 Traverse — A series of consecutive lines whose lengths and directions are known. In an open traverse, the lines are continuous but do not return to the starting point while in a closed traverse the lines return to the starting point making a complete circuit.

2.84 Unconsolidated Surface Deposits — Surface deposits, such as moss, peat, sand, gravel, silt or mud.

2.85 Ventilation Plan — A plan required by law, which shows the system of ventilation in a mine and the means of controlling them, besides the other information as required by law.

2.86 Warning Lines — The lines required to be marked on working plans as to indicate the limit beyond which workings should not extend (means that any advance beyond that line will bring the workings within a distance of 120 meters of the body of water or such greater distance as may be fixed by the mine authority).

2.87 Water Danger Plan — A plan required by law which shows every source of water on surface and underground mine workings, mine openings, every boreholes, geological disturbance, surface contours, high flood line, spot levels, benchmarks, etc, for guarding against danger of inundation of the mine.

2.88 Weisbach Triangle — The highly attenuated triangle formed by the plan position of two shaft plumb lines and one observation station.

2.89 Weiss Quadrilateral — The quadrilateral formed by the plan position of two shaft plumb lines and one observation stations.

2.90 Working Papers — The field and office notes and calculations relating to the plans, drawings and sections of a mine which are required by law to be preserved. These papers are sent to the District Inspector of Mines on the abandonment of the mine.

2.91 Zenith and Nadir Plummet — An easy-to-use instrument for defining plumb plane very accurately used for maintaining verticality of a deep shaft during sinking, transfer of three-dimensional co-ordinates to U/G working in correlation and other upwards and downwards plumbing operations. Latest development in the instrument is automatic zenith and nadir laser plummet.

Indian Standard

MINING — GLOSSARY OF TERMS

PART 5 BORING AND EXPLORATION

1 SCOPE

This standard (Part 5) covers the definitions of terms used in mining industry in connection with boring and exploration.

2 TERMS AND DEFINITIONS

2.1 Air Flushing — The circulation of air through the drilling apparatus during drilling to cool the bit and to remove the cuttings from the hole.

2.2 Auger — A tool, developed from the Archimedean screw, used for soil sampling or the drilling of shallow holes.

2.3 Auger Stem — *See* Drill Stem.

2.4 Bailer — A tube, fitted with a valve at its base, which is lowered into a borehole to remove cutting and water.

2.5 Banka Method — A manual method of boring used for sampling alluvial deposits.

2.6 Beche — *See* Fishing Tools.

2.7 Bentonite — A special form of thixotropic clay used in the composition of drilling mud.

2.8 Bevel-Wall Bit — A diamond coring bit with its inner walls tapered to house a split ring core lifter.

2.9 Bit — The cutting tool of a drilling or boring appliance.

2.10 Boart — *See* Diamond.

2.11 Borehole Logging — The determination of the physical, electrical and radioactive properties of the rocks traversed by a borehole.

2.12 Boring Head — *See* Drill Head.

2.13 Bottom Discharge Bit — A diamond coring bit having a series of longitudinal holes along the length of the crown to provide a straight flow of flushing media through the face of the bit to facilitate minimum contact of flushing media with the incoming core to minimize core loss.

2.14 Bracehead — A long handle used to turn the drill string in percussive drilling.

2.15 Bull-Nose Bit — *See* Plug Bit.

2.16 Bull Wheel — A reel used in rope drilling to accommodate the boring rope by which the bit is suspended in the hole.

2.17 Cable Drilling — *See* Rope Drilling.

2.18 Calf Wheel — A reel used in rope drilling to accommodate the boring rope by which the casing is raised or lowered.

2.19 Caliper — An instrument used in conjunction with a microlog which, when lowered down a borehole, measures and records the internal diameter throughout its depth.

2.20 Calyx — *See* Sediment Tube.

2.21 Calyx Drilling — A method of rotary drilling using a toothed cutting bit or chilled shot.

2.22 Casing — Piping used to support the sides of a borehole. Flush coupled casing has female connection at both ends and while joining with other casing a coupling with two male connections is used. Flush-joint casing has a male thread at one end and female thread at the other; no coupling is used.

2.23 Casing Bit — A diamond-set rotary bit designed to bore out an annulus slightly larger than the casing. It is withdrawn before the casing is inserted.

2.24 Casing Drive Hammer — A weight used to drive casing down a borehole.

2.25 Casing Drive Head — A collar screwed to the top of the column of casing to prevent the casing from being damaged by the impact of the drive hammer.

2.26 Casing Drive Shoe — A hardened steel shoe screwed to the lower end of the casing to protect the casing when it is driven down a hole by percussive means.

2.27 Casing Jar Hammer — A drive hammer used to extract casing.

2.28 Casing Shoe — A diamond or tungsten (T.C.) set rotary bit screwed to the end of a casing string. It clears the way for casing by reaming the already drilled hole and allows the drilling string to pass through for further drilling.

2.29 Cathead — A winch used primarily to raise or lower casing.

2.30 Cavings — Rock fragments which fall from the sides of a borehole.

2.31 Chilled Shot Bit — A flat-surfaced bit used with hardened steel shot to drill rock by a milling action.

2.32 Chilled Shot Drilling — A method of rotary drilling in which chilled steel shot is used as the cutting medium.

2.33 Chopping Bit — A chisel-bit used in rotary drilling to break up dropped core or broken rock.

2.34 Circulating Fluid — The fluid, which may be water, mud or air, circulated through the drilling apparatus during drilling. Its chief functions are to remove the cuttings, to cool the bit, and in the case of mud to support the sides of the hole.

2.35 Circulating Pump — The pump used to circulate mud or water through the drilling column.

2.36 Clinometer — An instrument used to determine the amount and direction of dip of rock strata.

2.37 Collar — The mouth of a borehole.

2.38 Collaring — The operation of starting to bore a hole.

2.39 Concave Bit — *See* Plug Bit.

2.40 Conductor Casing — *See* Standpipe.

2.41 Congo — *See* Diamond.

2.42 Core — The cylindrical sample of rock bored out during core drilling.

2.43 Core Barrel — The cylindrical container which receives the core as it is drilled (*see also* 'Double-Tube', 'Single-Tube', 'Split Core Barrel' and 'Wire Line Core Barrel').

2.44 Core Drilling — A method of rotary drilling in which a core is recovered.

2.45 Core Lifter — A spring clip at the base of the core barrel which enables the core to be broken off from the rock formation at the end of each run and prevents the slippage of core while being lifted/brought out of the hole.

2.46 Core Picker — A cylinder with flat internal springs used to recover dropped core.

2.47 Core Shell — *See* Reaming Shell.

2.48 Counter Flush Boring — A method of core drilling in which the circulating fluid passes down the borehole and returns up the inside of the rods, providing continuous recovery of the core.

2.49 Cross Bit — A percussive bit which has four chisel edges arranged in a cross.

2.50 Crown — Synonymous with bit; also used to denote that part of a bit containing the diamonds.

2.51 Crown Block — A pulley block mounted at the top of a derrick from which the travelling block is suspended.

2.52 Dart — *See* Fishing Tools.

2.53 Deflection — The intentional alteration of the course of a borehole in directional drilling.

2.54 Deflection Wedge — A wedge-shaped tool inserted in a borehole to direct the bit along a prescribed course.

2.55 Derrick — The framework over a borehole, used primarily to allow lengths of drill rod to be added to the drilling column.

2.56 Deviation — The wandering of a borehole from its intended course.

2.57 Diamond — A diamond of industrial grade used as the cutting element in drill bits; known variously as boart, bort, bortz, carbon, congo, etc.

2.58 Diamond Bit — A rotary bit using diamonds as the cutting media.

2.59 Dip Meter — An instrument used to record the amount and direction of the dip of strata exposed in the sides of a borehole.

2.60 Directional Drilling — Drilling in which the course of a borehole is controlled by deflection wedges or other means. The technique of directional drilling is used:

a) to deflect a deviated borehole back on to course, and

b) to deflect a borehole off course, either to by-pass an obstruction in the hole or to take a second core. The drilling of a bore in a predetermined direction.

2.61 Double Tube Core Barrel — A core barrel fitted with an inner tube to protect the core from erosion by the circulating fluid.

2.62 Drag Bit — A rotary bit which has two or more cutting blades or wings with hard-faced cutting edges (various types are the two-wing, three-wing, fish-tail and pilot bits).

2.63 Draw Works — The winch used in rotary drilling to raise and lower the drilling column and casing.

2.64 Drill Collar — A heavy drill rod used immediately above the core barrel to minimize deviation of the hole.

2.65 Drill Head — The assembly which applies the drilling pressure and rotation to the drill rods.

2.66 Drilling Column — The column of drill rods to the end of which the bit is attached.

2.67 Drilling Rate — The overall rate of advancement of the borehole.

2.68 Drill Rods — Lengths of rod coupled together forming the drilling column, to the end of which the bit is attached.

2.69 Drill Stem — A long rod used in rope drilling to increase the weight acting on the bit.

2.70 Drill String -- The string of tools commonly used in rope drilling, namely, rope socket, sinker bar, sliding jars, drill stem and drill bit.

2.71 Drive Rod — A splined rod which is the drill head of a diamond drilling apparatus by means of which pressure and rotation are applied to the column of drill rods.

2.72 Fir-Tree Bit — A rotary bit in which a number of cutting edges are arranged behind a pilot bit to enlarge the hole.

2.73 Fishing Tools or Tackle — Tools used to recover objects lost or stuck down a borehole, such as a length of rods, remaining in the hole after the drill column has broken (*see* 'Beche', 'Dart', 'Overshot Assembly', 'Rotary Tap', 'Spear' and 'Spring Dart').

2.74 Fish-Tail Bit — *See* Drag Bit.

2.75 Flush-Coupled Casing — *See* Casing.

2.76 Flush Joint Casing — *See* Casing.

2.77 Four Cutter Bit — *See* Roller Rock Bit.

2.78 Gamma-Ray Log — The record obtained in borehole logging of the radioactive emission of the rocks traversed by a borehole.

2.79 Geochemical Prospecting — A method of mineral exploration based on the systematic measurement of the chemical properties of rocks, soils, river sediments, waters, etc.

2.80 Geophone — An electromechanical device/sensor to record the seismic waves.

2.81 Geophysical Prospecting — The making and interpretation of certain physical measurements to obtain information of the sub-surface geological structures.

2.82 Gravimeter — An instrument used to measure relative values of gravitational force, indirectly depicting density of underlying rock formation.

2.83 Hand-Set-Bit — A rotary bit in which diamonds are set in cavities drilled in the surface of the bit.

2.84 Hoist — *See* Draw Works.

2.85 Impregnated Bit — A bit having very small diamond grits located at radnom throughout the sintered matrix. In the course of drilling the sintered matrix wears out gradually allowing new diamond grits to expose for cutting action.

2.86 Inclinometer — An instrument used to determine the amount and direction of deviation of a borehole from vertical.

2.87 Jar Hammer — *See* Casing Jar Hammer.

2.88 Kelly — The rod usually square in section attached to the top of the drill column in rotary drilling. It passes through the rotary table and is turned by it, but is free to slide down through it as the borehole deepens.

2.89 Laterolog — A type of electrical log giving optimum value of electrical resistivity of rocks traversed by a borehole.

2.90 Lifting Bail — The link by which the water swivel is suspended.

2.91 Marsh Funnel — A funnel used to measure the viscosity of drilling mud.

2.92 Microlog — The record obtained in borehole logging of the porosity of the rocks traversed by a borehole.

2.93 Monkey — *See* Casing Drive Hammer.

2.94 Mud Balance — An instrument used to measure the density of drilling mud.

2.95 Mud-Flush Drilling — A method of drilling in which a mud of controlled physical properties is used as the circulating fluid.

2.96 Neutron Log — The record obtained in a borehole logging by measurement of captured neutrons giving an index of hydrogen content/porosity of the rock traversed in a borehole.

2.97 Offtake — A length of boring rods unscrewed and detached at the top of a borehole.

2.98 Overshot Assembly — *See* Fishing Tools.

2.99 Penetration Rate — The actual rate of penetration of drilling tools.

2.100 Penetrometer — An instrument which automatically records the depth of drilling and the penetration rate.

2.101 Percussive Drilling — A method of drilling in which repeated blows are applied by the bit which is rotated intermittently.

2.102 Pilot — *See* Reaming Pilot.

2.103 Pilot Bit — *See* Plug Bit and Drag Bit.

2.104 Plug Bit — A non-coring diamond-set bit which can be in the form of a bull nose bit, pilot bit or concave bit.

2.105 Prove — To ascertain the character of the strata by boring or tunnelling.

2.106 Rathole — A hole drilled alongside a borehole to accommodate the kelly during rod changing.

2.107 Reaming Bit — A rotary bit used to enlarge the diameter of a borehole.

2.108 Reaming Pilot — A smooth bar used to guide a reaming bit or casing bit in the hole.

2.109 Reaming Shell — A cutting cylinder, fitted between the bit and the core barrel or casing, used to maintain the diameter of the borehole. (The outside wall may be set with diamonds or hard metal.)

2.110 Recovery Tap — *See* Fishing Tools.

2.111 Reversed Flush Boring — *See* Counter Flush Boring.

2.112 Rig — The complete equipment used for drilling a borehole.

2.113 Rocking Beam — *See* Walking Beam.

2.114 Roller Rock Bit — A rotary bit fitted with two or more hardened steel or tungsten-carbide tipped rollers of cylindrical or conical form (variously known as two-cone, three-cone or four-cutter bits, etc).

2.115 Rope Drilling — A system of percussive drilling in which the drill string is suspended at the end of a long rope.

2.116 Rose Bit — A rotary bit used to mill through steel objects lost in a borehole.

2.117 Rotary Drilling — A method of drilling in which rotation and thrust are applied to the bit, producing a continuous cutting action.

2.118 Rotary Table — The mechanism used in some forms of rotary drilling to rotate the drilling column.

2.119 Round Trip — The operation of withdrawing the drill rods and bit, etc, from the hole, of extracting core, replacing rods and bit and resuming drilling.

2.120 Sand Reel — The reel on which the bailer rope is wound.

2.121 Sediment Tube — A cylindrical container fitted above the core barrel to catch the coarse cuttings which tend to fall back to the bottom of the hole.

2.122 Set-Out — *See* Offtake.

2.123 Shearmeter — An instrument used to measure the gel strength of drilling mud.

2.124 Single-Tube Core Barrel — The simplest core barrel, having only a single cylindrical tube.

2.125 Sinker Bar — A heavy rod used to increase the snatching effect of the sliding jars in rope drilling.

2.126 Sintered Bit — A rotary bit in which diamonds are located in a predetermined pattern at the surface of a sintered matrix.

2.127 Sliding Jars — A sliding joint used in rope drilling to apply a snatch to the bit at each upward stroke.

2.128 Slips — A tool used at the mouth of a borehole to grip the drill rods or the casing, as these are being inserted or withdrawn.

2.129 Sludge — Rock cuttings produced by the drill bit.

2.130 Sludge Barrel — *See* Sediment Tube.

2.131 Slush Pump — *See* Circulating Pump.

2.132 Spear — *See* Fishing Tools.

2.133 Split Core Barrel — A type of core barrel which can be opened longitudinally to remove the core.

2.134 Spring Dart — *See* Fishing Tools.

2.135 Spudding — The operation, in rope drilling, of boring through the sub-soil at the start of a hole.

2.136 Spudding Bit — A heavy chisel-bit used in percussive drilling to drill through sub-soil.

2.137 Standpipe — The first length of casing inserted in a borehole.

2.138 Tectonometer — An apparatus used on the surface to obtain knowledge of the structure of the underlying rocks.

2.139 Travelling Block — The pulley block which hangs below the crown block and is used for lifting the drilling column.

2.140 Turbo Drilling — A system of drilling in which the bit is directly driven by a turbine at the bottom of the hole.

2.141 Two-Cone Bit — *See* Roller Rock Bit.

2.142 Under Reaming Bit — An expanding bit used to enlarge the diameter of the hole below the casing to allow the casing to be lowered further down the borehole.

2.143 Walking Beam — The beam used to impart a reciprocating movement to the drilling column in percussive drilling.

2.144 Wall Scraper Bit — A rotary bit used to enlarge the diameter of a borehole.

2.145 Water Swivel — The swivel coupling through which the circulating fluid enters the drilling column.

2.146 Wedge Reaming Bit — A tapered or bull-nose rotary bit used to restart drilling after a deflection wedge has been fitted into a borehole.

2.147 Wedge Rose Bit — A rotary bit used to mill off part of the top ring of a deflection wedge.

2.148 Weight Indicator — An instrument which records the weight of the column of rods suspended from the boring rope.

2.149 Wire Line Core Barrel — A double tube core barrel, the inner tube of which can be removed to extract a core without withdrawing the drill rods.

Indian Standard

MINING — GLOSSARY OF TERMS

PART 6 STRATA CONTROL

1 SCOPE

This standard (Part 6) covers the terms relating to strata control used in the field of mining.

2 TERMS AND DEFINITIONS (GENERAL)

2.1 Abutment — The region adjoining an excavation which is normally subjected to increase in stress as a consequence of the redistribution of load. This may be at the front of, or at the sides or rear of a working face.

2.2 Advance Pack (Buttress Pack) — A small pack built in advance of the gate side pack to limit the spreading of the adjoining caved waste towards the roadway in a longwall face .

2.3 Anti-Flushing Shields — A curtain of bars, plates or chains on the waste side of powered supports to hold back the material which flushes or falls from the caved waste.

2.4 Anti-Slewing Struts — Bars fitted between powered supports to prevent slewing of the supports on gradients.

2.5 Arch Girder (Ring) — A rolled steel section bent into the form of an arch and normally in two or more lengths joined together to form a support for the roof and sides of a roadway.

2.6 Articulated Arch — An arch in which the component lengths are hinged together.

2.7 Articulated Bar — *See* Link Bar.

2.8 Backfill — Material which is used to fill the void following extraction of mineral, namely:

a) Overburden replaced after opencast extraction of mineral; and

b) Loose material placed behind the shaft wall or the mining of any other excavation.

2.9 Backward Hading Breaks — Breaks whose planes are inclined from the normal to the plane of the seam, towards the goaf.

2.10 Bar — A support set parallel to the roof.

2.11 Barrier Pillars — Pillars or strip of coal or other mineral suitably dimensioned and disposed, left unworked for the purpose of dividing a seam or mine into separate working panels or districts.

2.12 Bar Slide Bracket System — A system of support in which roof bars are slid forward on brackets attached to adjacent parallel bars, props being then set to the newly advanced bars.

2.13 Bar Slide Head — A device at the top of support enabling the support to remain set to the roof while the bar above it is released and slid forward to a new setting position.

2.14 Bar Slide Head System — A system of support in which roof bars are removed forward through bars slide heads, the props continuing to carry load.

2.15 Bed Separation — The moving apart of stratified beds caused by excavation.

2.16 Breaking-Off Line — The support line at the rear edge of a longwall face along which the roof is induced to break.

2.17 Breaking-Off Props — Props set alongside the edge of the intended goaf or of a ripping, to determine the line of break.

2.18 Breaks — The fractures that develop in the roof, floor or sides of an excavation, due to deformation of the surrounding strata.

2.19 Bump (Crump) — A sudden and heavy release of strain energy in the major body of rock surrounding a mine working, resulting in displacement of the strata.

2.20 Buttress Pack — *See* Advance Pack.

2.21 Cambered Girder — A curved roof bar set in a roadway with its convex surface to the roof.

2.22 Cantilever Bar — A roof bar projecting forward to support the roof beyond the propped area.

2.23 Cap — *See* Lid.

2.24 Capsule — *See* Hydraulic Load Cell.

2.25 Catch Prop — A supplementary prop not forming part of the planned support system.

2.26 Caving — The process of permitting the roof or hanging wall to collapse into the space from which coal or mineral has been excavated.

2.27 Chock — Strong roof support consisting of layers of hardwood or a steel structure (*see also* Hydraulic Chock).

2.28 Chock Prop — A heavy duty prop normally erected to induce caving or to provide additional support in a roadhead.

2.29 Cleavage — In a crystalline material one or more series of parallel planes along which the mineral tends to split.

In a rock, definite parallel closely spaced planes along which it may split, and which may be highly inclined to the bedding planes.

2.30 Cog — A roof support built from interlaced layers of wood and usually filled with dirt.

2.31 Competent Beds — Beds which have physical characteristics such that they respond to tectonic forces by folding and faulting, rather than by crushing and flowing. (Competent beds are relatively strong and incompetent beds weak.)

2.32 Convergence — Movement of roof and floor towards each other after removal of mineral. The rate of convergence is measured as either:

a) The convergence for a given advance of the face, and

b) The convergence in a given time.

2.33 Convergence Recorder — A device for measuring and/or recording the amount by which roof and floor approach each other.

2.34 Coupled Bar — *See* Link Bar.

2.35 Creep — The property of certain rocks of undergoing progressive deformation with time when subjected to sufficiently high constant stress.

2.36 Crown — The top of a roadway or arch girder.

2.37 Crump — *See* Bump.

2.38 Crush Block — A block of soft material inserted between a support and the roof, or floor, between two members of a support system, or incorporated within a brick wall, to permit yield and so reduce deformation of the support.

2.39 Dint — A place where material is removed from the floor of a roadway to increase height.

or

To cut away the floor to make height.

2.40 Dome Theory — The theory of rock mechanics which suggests that a wide excavation underground produces a surrounding dome shaped region within which the rock is broken.

2.41 Draw Roof — *See* Following Roof.

2.42 Drummy — The hollow sound emitted when loose rock forming part of the roof, floor or sides of an excavation is struck.

2.43 Dummy Gate (Dummy Road) — A road which is formed but not maintained behind a longwall face, to provide material for building intermediate packs.

2.44 Dynamometer Prop — A prop which is capable of indicating or recording the load which it is carrying.

2.45 Early Bearing Prop — A yielding prop which is designed to accept its maximum load soon after it is set (*see also* Late Bearing Prop).

2.46 Epicentre — The place of origin of a rock burst.

2.47 Fall — Loose material which has fallen from the roof or sides of an excavation.

2.48 Flat Jack — A hydraulic pressure device used to impose measured load on a support or rock *in situ*.

2.49 Floor Bolt — *See* Rock Bolt.

2.50 Floor Penetration — The penetration of loaded supports into the floor of the seam.

2.51 Floor Strength — *See* Load Bearing Capacity.

2.52 Flushing — The displacement of loose material from the waste into the supported area. The crumbling of the roof or sides around the supports in an excavation.

2.53 Following Roof (Draw Roof Ramble) — A layer of roof which falls as coal is excavated, or soon after.

2.54 Forepoling — The use of girders or bars projecting forward in cantilever as temporary supports beneath newly exposed roof.

2.55 Forepoling Bracket (Horsehead Bracket) — A bracket used for the attachment of a forepole to a permanent support, and designed to permit a girder to be slid forward as excavation proceeds.

2.56 Forward (Front) Abutment — Pressure abutment in advance of a working face (*see* Abutment).

2.57 Forward Handling Breaks — Breaks whose planes are inclined from the normal to the plane of the seam, towards the face.

2.58 Frame Support — A support consisting of a base frame, two or more legs and a roof bar.

2.59 Friction Cap — A replaceable cap, made of material having a high coefficient of friction, which is fitted to the prop head.

2.60 Friction Prop — A roof support, the yield of which is controlled by a device depending for its operation upon friction between parts of the prop.

2.61 Front Abutment Pressure — *See* Abutment.

2.62 Goal Post Support — A frame support having two legs set usually at the ends of the bar.

2.63 Gutter — The narrow extension in height of a roof fall.

2.64 Harmonic Extraction — The working of one or more coal seams by means of a special layout and time sequence of extraction, the aim being to lower the overlying surface with a minimum of flexure, causing thereby a minimum of damage.

2.65 Head Tree — *See* Lid.

2.66 Heave — Upward movement of the floor.

2.67 Holing Sprag — *See* Nog.

2.68 Horsehead Bracket — *See* Forepoling Bracket.

2.69 Horsehead Girder — Girder used for forepoling in a roadway.

2.70 Hydraulic Chock — A large diameter hydraulic prop for heavy duty.

2.71 Hydraulic Load Cell (Capsule) — A load measuring device with a hydraulic system of load indicating.

2.72 Hydraulic Prop — A roof support dependent for its erection and yield under load on a hydraulic system embodying a hydraulic pump and relief valve.

2.73 Hydraulic Stowing — Filling or partly filling of a goaf with waste material transported underground in a hydraulic suspension.

2.74 Immediate Roof — In coal mining, the roof immediately above an excavation which is carried by the supports (*see also* Nether Roof).

2.75 Jack Prop — *See* Catch Prop.

2.76 Key Supports — Special supports installed at intervals and used to regulate the position of other powered supports on an inclined longwall face.

2.77 Lagging — Concrete, steel, timber, etc, placed between or behind permanent roadway supports.

2.78 Lameller Prop — Friction prop with a number of laminated members affording several friction surfaces.

2.79 Late Bearing Prop — A yielding prop which is designed to accept its maximum load late in its loading cycle.

2.80 Lateral Roof Movement — Relative movement along the plane of the seam, between the roof and the floor in longwall working.

2.81 Log — A prop in a powered support unit.

or

The lower member of a roadway arch.

2.82 Lid (Cap, Head Tree) — A compression piece, usually of wood, placed between a prop and the roof or between a prop and a bar.

2.83 Link Bar (Coupled Bar, Articulated Bar) — A roof bar which is capable of being coupled in line to another bar and is held in position against the roof by means of a wedge or a shoe.

2.84 Load Bearing Capacity

a) *Floor Strength, Roof Strength* — The inherent resistance of the mine floor or roof to penetration by supports.
b) The resistance offered by a roof support at its point of yield or failure.

2.85 Load Shedding — In a support, a sudden and unintentional loss of resistance to load.

2.86 Mechanical Stowing — Filling or partly filling the goaf with waste material projected by high speed belt or paddle wheel, or carried and compacted by a scraper bucket.

2.87 Natural Arch — The shape taken by an unsupported excavation as the roof breaks down.

2.88 Nether Roof — The stratum immediately above a coal seam (*see* also Immediate Roof).

2.89 Nog (Holing Sprag) — A steel or wooden wedge inserted in the cut to delay convergence and/or to prevent spalling of coal from the face.

2.90 Over-Riding — The breaking down of the roof at a waste edge over the supports and in advance of the designed breaking-off line.

2.91 Packing — The systematic use of dirt in underground excavations for the purpose of roof support and control.

2.92 Pneumatic Stowing — The filling or partly filling of a goaf with waste material blown through pipes by compressed air.

2.93 Powered Support (Self-Advancing Support, Walking Support) — A support which can be lowered, advanced and re-erected by mechanical energy.

2.94 Pressure Arch — An arch of relaxed strata which is created when any excavation is made, resulting in the redistribution of the normal strata pressures on to the abutments.

2.95 Prop — An individual straight support member set between the roof and the floor.

2.96 Prop Density — The number of props supporting a unit area of roof in a system of supports.

2.97 Prop-Free Front — A system of supports in a longwall face in which props are not normally set between the conveyor and the coal. The roof above and in advance of the conveyor is supported by cantilever bars set on props on the goaf side of the conveyor.

2.98 Prop Spacing — The distance between the sides of adjacent props in a support system.

2.99 Ramble — *See* Following Roof.

2.100 Rear Abutment Pressure — *See* Abutment.

2.101 Ring — *See* Arch Girder.

2.102 Ripping Lip — The edge of a ripping.

2.103 Rock Bolt (Floor Bolt, Roof Bolt) — Tensioned rod or rope anchored in a hole drilled into the rock to increase the inherent strength of a bed or beds.

2.104 Rock Burst — The violent and sudden release of strain energy in the major body of rock surrounding a mine working which results in displacement of the strata (*see* also Bump).

2.105 Romometer — A device for measuring relative lateral displacement between roof and floor.

2.106 Roof Bolt — *See* Rock Bolt.

2.107 Roof Strength — *See* Load Bearing Capacity.

2.108 Self Advancing Support — *See* Powered Support.

2.109 Servo-Lowering — The technique employed in the operation of a powered support by which the support is advanced with minimum of lowering from the roof.

NOTE — The term is a misnomer since the lowering is not assisted but is only controlled, in as much as the degree of lowering is limited by the pressure required in the ram advancing the support.

2.110 Setting Device — The means provided to enable supports to be erected at their normal setting loads.

2.111 Setting Load — The load at which a support is designed to be set.

2.112 Side Abutment Pressure — *See* Abutment.

2.113 Sill — The lower bar of a square timber frame.

2.114 Slide Bar Bracket — *See* Bar Slide Bracket System.

2.115 Slide Bar System — *See* Bar Slide Head System.

2.116 Sliding Arch — A yielding arch girder designed to accommodate strata movement by means of sliding connections at the joints between the component lengths.

2.117 Slope — The inclination, measured from the horizontal, of the sides of a subsidence basin.

2.118 Slusher Packing — A form of mechanical packing in which a rope hauled bucket is used to move and compact material in a goaf.

2.119 Solid Stowing — The process of completely filling the goaf with material.

2.120 Sprag — A prop set to secure the sides of a working place or cavity.

2.121 Stilt — A yield mechanism designed to accommodate convergence in the leg of a roadway support.

2.122 Stowing — The disposal of material in a goaf by pneumatic, mechanical or hydraulic means.

2.123 Strip Pack — A continuous pack of limited width having a waste on either side, built behind a longwall face and extended as the face advances.

2.124 Super-Incumbent Load — *See* Depth Pressure.

2.125 Support Pillar — A suitably dimensioned and positioned pillar left to support underground workings and/or surface features.

2.126 Support Rules — Rules appertaining to the systematic disposition and setting of supports in a particular working area.

2.127 Support System — The orderly pattern or arrangement of supports.

2.128 Timber Set — A wooden frame used as a support, comprising two props and two horizontal members, a bar and a sill.

2.129 Tip Load — The maximum resistance to roof load offered by the forward end of a cantilever bar.

2.130 Track — The space between two adjacent rows of props or between the front row of props and a longwall face.

2.131 Trompeter Zone — Zone of broken ground surrounding an excavation.

2.132 Walking Support — *See* Powered Support.

2.133 Weighting — The release of energy which occurs on or about a longwall face as the main roof collapses behind it.

2.134 Yield

a) The convergence accommodated by a support.

b) The maximum convergence which a support is designed to accommodate.

2.135 Yield Arch — An arch designed to accommodate convergence of the strata without distortion.

2.136 Yield Load — The load at which a yielding support begins its designed yield.

2.137 Yield Support — A support which is designed to accommodate convergence between roof and floor.

2.138 Yield Valve — The mechanism in a hydraulic support which allows the support to begin to close at a predetermined pressure.

3 TERMS AND DEFINITIONS CONCERNED WITH SUBSIDENCE (*see* Fig. 1)

3.1 Angle of Break — The angle of inclination of a line connecting a point at the edge of the workings and the point of maximum tensile strain at the surface, measured from the normal to the seam.

3.2 Angle of Draw — See Limit Angle.

3.3 Area of Influence — See Critical Area.

3.4 Critical Area (of Extraction) (Area of Influence) — That area the working of which causes the complete subsidence of one point on the surface.

3.5 Critical Width — The width of a critical area.

3.6 Half-Subsidence Point — The point in a subsidence profile where the subsidence is half the maximum amplitude (*see also* Transition Point).

3.7 Lateral Displacement — The horizontal displacement of a point caused by any working.

3.8 Limit Angle (Angle of Draw) — The angle of inclination of a line connecting the edge of the workings and the edge of the observable subsidence area, measured from the normal to the seam.

3.9 Longitudinal Subsidence Profile — A curve depicting subsidence on a section drawn parallel to the direction of advance of an underground excavation.

3.10 Residual Subsidence Profile — The time dependent part of subsidence movement, that is, that which occurs after completion of extraction.

3.11 Slope (Tilt) — The gradient, caused by subsidence, between any two points on a subsidence profile.

3.12 Sub-Critical Area (of Extraction) — An area of working smaller than the critical area. (When a sub-critical area is being worked, the point on the surface under examination does not undergo complete subsidence.)

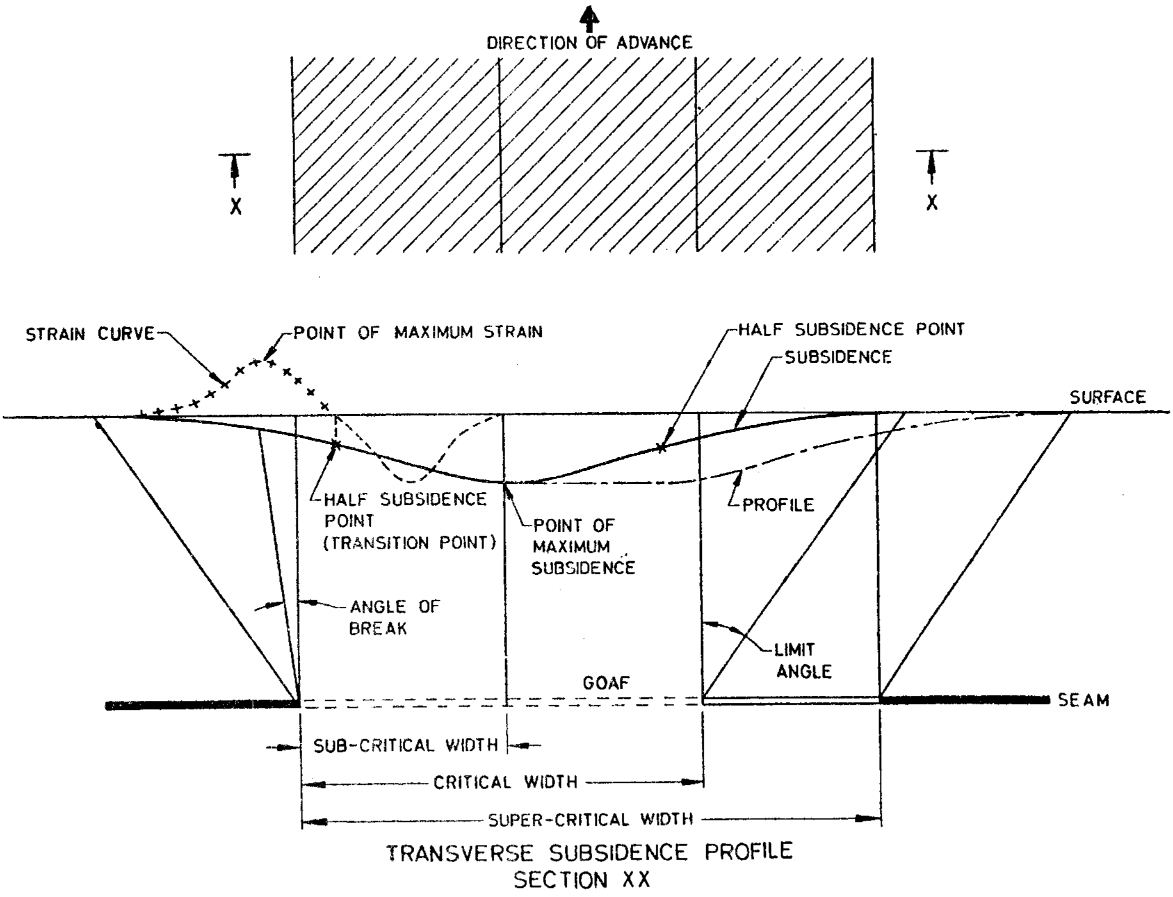


FIG. 1 SUBSIDENCE TERMS

3.13 Subsidence — The vertical displacement of a point anywhere within the subsidence trough.

3.14 Subsidence Development — The manner in which the rate of subsidence changes in relation to the position of the moving face of an underground excavation.

3.15 Subsidence Factor — The ratio of complete subsidence to the thickness of the seam(s) extracted.

3.16 Subsidence Profile — *See* Longitudinal Subsidence Profile, and Transverse Subsidence Profile.

3.17 Subsidence Trough — The depression formed by strata subsiding into an excavation.

3.18 Super-Critical Area (of Extraction) — An area of working greater than a critical area, that is, which causes an area on the surface to undergo complete subsidence.

3.19 Tilt — *See* Slope.

3.20 Time/Subsidence Curve — The values of subsidence of a given point on the surface plotted against time as base.

3.21 Transition Point — The point of transition between concave and convex curvature of a subsidence profile.

NOTE — This coincides with the half-subsidence point on the subsidence profile.

3.22 Transverse Subsidence Profile — A curve depicting subsidence on a section drawn at right angles to the direction of advance of an underground excavation.

Indian Standard

MINING — GLOSSARY OF TERMS

PART 7 WINNING AND WORKING

1 SCOPE

This standard (Part 7) covers the definition of terms used in mining industry in connection with drainage.

2 TERMS AND DEFINITIONS

2.1 Abandoned Workings — Workings from which the extraction of mineral has permanently ceased and which are fenced off or sealed off so that the roadways have ceased to form part of the transport, travelling or ventilating system of the mine (*see also* Discontinued Workings).

2.2 Activated Plough (Dynamic Plough, Impact Plough, Percussive Plough) — A coal cutting plough having power operated cutting blades to which a vibratory or oscillating motion is imparted to improve the cutting action.

2.3 Activated Ramp Plates — *See* Shuttle Plough.

2.4 Adit — A roadway driven from the surface to afford an entrance to a mineral deposit.

2.5 Advance Heading — A roadway in the seam driven ahead of productive workings.

2.6 Advancing Longwall Face — A longwall face with the access gate roads lengthening with the advance of the face.

2.7 Advancing System — A system of mining in which roads and faces are driven simultaneously, in the coal seam, normally to predetermined boundaries.

2.8 Anbauhobel (Attachment Plough, Insertion Plough) — A coal plough, the independent drive of which is attached to an armoured conveyor.

2.9 Anchor Station — A place where a device to prevent uncontrolled movement of the delivery end unit of a conveyor is stationed.

2.10 Anderton Shearer Loader — *See* Shearer Loader.

2.11 Angle of Attack — The angle (lead or lag) which the horizontal axis of the cutting element of a machine makes with the line of face.

2.12 Angle Station — A station provided with means of changing the horizontal direction of travel of a conveyor or ropeway.

2.13 Arc-Shearer (Universal Arc-Shearer) — A mobile cutter, used in driving headings having a jib that can cut at any horizon and at any angle.

2.14 Arc-Wall Cutter (Arc-Waller) — A mobile cutter, used principally for driving headings, having a long cutting jib which can be moved through an arc to make a horizontal cut across the face of the heading.

2.15 Arc-Waller — *See* Arc-Wall Cutter.

2.16 Armoured Flexible Conveyor (AFC) (Heavy Armoured Conveyor) — A heavy duty chain conveyor designed to carry a coalcutter or power loader on the framework and capable of being continually snaked forward, section by section, as the face advances.

2.17 Articulated Roof Bar — A hinged roof bar, the design of which permits a degree of flexibility enabling it to conform with variation in contour of the roof.

2.18 Attachment Plough — *See* Anbauhobel.

2.19 Auger (Coal) — A machine which wins coal by the drilling large diameter holes in the seam, and discharges the coal by way of a scroll.

2.20 Auto-Percussive Plough — A percussive plough, having moving blades which are set in motion automatically when resistance to the thrust they exert on the coal exceeds a predetermined value.

2.21 Backbye Work (Backwork, Oncost Work) — Work done outbye the working face.

2.22 Back Overman — A back shift overman.

2.23 Back Ripping — A place outbye the face at which a roadway is enlarged, usually by taking down the roof.

2.24 Backs — Coal projecting from the line of face after cutting and/or loading has been completed.

2.25 Back Shear — A vertical cut made in the seam in advance of and parallel to the face line.

2.26 Back Shift — Normally, the afternoon shift.

2.27 Back Work — *See* Backbye Work.

2.28 Bank

a) The surface area immediately surrounding the mouth of a shaft.

b) The coal face.

2.29 Bank to Bank — The period between the time a miner goes underground and the time he returns to the surface.

2.30 Bannock — To hole by hand at the top of a seam.

2.31 Bar — A support set parallel to and in contact with the roof, or occasionally the floor.

2.32 Bare — To strip or cut by the side of a fault or boundary.

2.33 Barrier — Strip of coal or other mineral left unworked in a mine either:

a) for protection against flooding, explosion, fire, flammable or noxious gases, or any danger; and
b) along the boundary of a mineral royality, between two mineral fields or between two mines.

2.34 Barrier Pillars — Pillars or strips of coal or other mineral, suitably dimensioned and disposed, left unworked for the purpose of dividing a seam or mine into separate working panels or distracts.

2.35 Bate — *See* Dint.

2.36 Bench (Lift) — To work coal or mineral in layers from the top downward.

2.37 Benk — *See* **2.28**(b) Bank.

2.38 Bi-Directional Shearer (or Bi-Di Shearer) — A shearer loader arranged for cutting and loading mineral in either direction of machine travel.

2.39 Bing — *See* Spoil Heap.

2.40 Blast — Common term for compressed air.

2.41 Boom Ripper — A machine for cutting down a ripping by means of a rotating, cutting head mounted on a fixed or telescopic hydraulically operated boom.

2.42 Bord — A roadway driven in bord and pillar working, normally at right angles to the main cleat of a mineral seam.

2.43 Bord and Pillar (Pillar and Stall, Room and Pillar, Stoop and Room) — A system of mining in which roadways are driven in the solid coal (the first working) leaving pillars between them. The pillars may be left to support the roof, or later extracted in part or whole (the second working).

2.44 Bord Face — A longwall face advancing in a direction substantially at right angles to the line of main cleat.

2.45 Bordways — *See* On Bord.

2.46 Bord, Working on — *See* On Bord.

2.47 Bottoms — *See* Bottom Coal.

2.48 Bottom Canch — *See* Dint.

2.49 Bottom Coal (Bottoms, Floor Coal) — The lowest part of a seam, which may or may not be extracted.

2.50 Boundary Pillar — A pillar of coal or of mineral left to mark the limit of working of a mine.

2.51 Brae — *See* Incline.

2.52 Break-in — To advance part of the working face on a narrow front.

2.53 Broken Working — *See* Second Working, Dint and Rip.

2.54 Brush

a) *See* Dint.
b) *See* Rip.

2.55 Bucket Loader (Shovel Loader) — A self-propelled mechanical shovel for loading mineral or rock.

2.56 Bump — A sudden and heavy release of strain energy in the major body of rock surrounding a mine working, resulting in displacement of the strata.

2.57 Buttock — In some longwall faces, a short step in the line of face, and substantially at right angles to it, from which coal can be made conveniently worked.

2.58 Bye Work — *See* Deadwork.

2.59 Cable Carrier — *See* Cable Handler.

2.60 Cable Handler (Cable Carrier) — Equipment fitted to a longwall face conveyor, and used with certain power loaders for handling moving cables and hoses.

2.61 Cable Handling Equipment — Equipment fitted to a longwall face conveyor, and used with certain power loaders for handling moving cables and hoses.

2.62 Canch (Caunch) — That part of the roof of an underground roadway which has to be taken down (top canch), or of the floor to be taken up (bottom canch), in order to make height or grade the road.

2.63 Canopy

a) A prefabricated structure used temporarily to give protection from falling rock.
b) The roof member of a chock type powered support.

2.64 Caunch — *See* Canch and Dint.

2.65 Cavilling — The drawing of lots by miners, at stated periods determine the place in which they will work.

2.66 Caving — The controlled collapsing of roof strata behind the supports of a working face.

A particular method of unfilled stopping wherein the mineral is allowed to breakdown by its own weight.

2.67 Chap — *See* Sound.

2.68 Chargehand — *See* Chargeman.

2.69 Chargeman (Chargehand) — In coal mining, a working foreman or team leader who is not an official.

2.70 Chock — A support which offers a high resistance to an area of roof which is usually substantially greater than that supported by a prop.

2.71 Clean Coal

a) A coal seam free from dirt partings.

b) Coal from which impurities have been separated.

2.72 Coalcutter (Cutter) — Any machine designed to cut coal, but more particularly the type which has a flat jib fitted with a chain and cutter picks.

2.73 Coal Dust — Finely divided coal which will pass through a 250-micron IS sieve.

2.74 Coal Face — *See* Face.

2.75 Coal Getter — *See* Collier.

2.76 Coal Head — The working place in a coal heading.

2.77 Coal Plough (Plough) — A robust steel device, substantially of wedge shape, which is hauled along the face shearing a thin strip of coal from the seam and deflecting the strip on to the face conveyor.

2.78 Collier (Coal Getter, Fillers, Hewer, Stripper) — A person engaged in getting and filling coal on to a conveyor or into tubs and, where required, setting the necessary roof supports.

2.79 Colliery Consumption — The part of the output of a colliery which is used on the colliery premises.

2.80 Colliery (Pit) — A coal mine (*see also* Mine).

2.81 Continuous Miner (Miner) — A machine used mainly for the cutting and loading of coal or other mineral in mine entries or narrow places.

2.82 Continuous Mining — The uninterrupted performance of mineral getting on consecutive shifts, so arranged that each shift carries on the work of the previous shift irrespective of the point in the operations at which the previous shift creased work.

In mechanized coal winning, a method in which the getter-loader is provided with continuity in clearance and support behind the machine.

2.83 Contraband — Generally, smoking materials and the means of igniting them, which are prohibited in safety-lamp mines.

2.84 Conveyor Creep — The undesirable longitudinal movement of conveyor structure.

2.85 Conveyor Track — That part of a longwall face occupied by the face conveyor.

2.86 Cranked Jib — *See* 'Swan-Neck Jib' and Fig. 1.

2.87 Cranked Pick — A cutter pick so designed that its head or blade is out of line with the shank.

2.88 Crop Coal — Bottom coal inadvertently left between the undercut and the intended floor, and subsequently removed to maintain the true floor horizon.

2.89 Crosscut

a) A short connection between adjacent roadways.

b) In horizon mining, a road driven at right angles to the laterals.

2.90 Cross Measures Drift — An underground roadway driven at an angle to the bedding planes of the strata.

2.91 Crut — *See* Stone Drift.

2.92 Curved Jib — A cutter jib which is curved to give both a horizontal and a shear cut (*see* Fig. 2).

2.93 Cut

a) To hew or to get mineral from the working face.

b) To hole a seam by hand or by means of a cutting machine, to provide a free face.

c) The holing made by hand or by the jib of a cutter.

2.94 Cutter — *See* Coalcutter.

2.95 Cutter Chain (Cutting Chain) — Heavy chain made up of a series of hinged links (holding detachable picks) which travels around the jib of a cutting machine (*see* 'Illustrations').

2.96 Cutter Jib (Jib) — A heavy rigid steel frame having a channel in which a cutter chain is constrained to travel.

NOTE — Various arrangements are used; See under the following types of jibs: Cranked Jib, Curved Jib, Duplex Jib, Frame Jib, Multi Jibs, Mushroom Jib, Ranging Jib, Swan-Neck Jib, Triglex Jibs, Turret Jib, Tubin Jibs and Undercutting Jib.

2.97 Cutter Loader (Getter Loader) — A machine which cuts mineral from the face and loads it on to a conveyor.

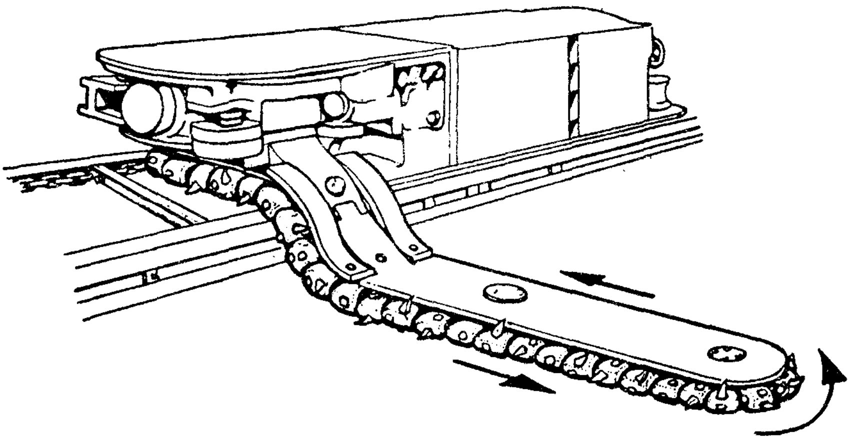


FIG. 1 CRANKED ON SWAN-NECK JIB

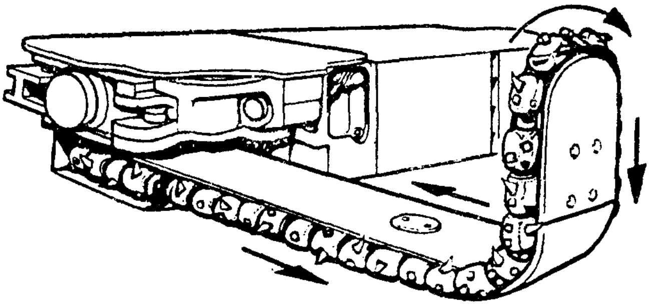


FIG. 2 CURVED JIB

2.98 Cutter Pick (Cutting Tool Pick) — A replaceable cutting tool in a machine used for the getting of coal or other mineral, or for ripping.

2.99 Cutter Run — *See* Cutter Track.

2.100 Cutter Track (Cutting Run, Cutter Run) — That part of a longwall face along which a coalcutter travels.

2.101 Cutting Chain — *See* Cutter Chain.

2.102 Cutting Horizon — A level (usually predetermined) at which a cut is made in coal or other strata.

2.103 Cuttings — *See* Gummings.

2.104 Cutting Run — *See* Cutter Track.

2.105 Cutting Tool — *See* Cutter Pick.

2.106 Cyclic Mining — Mineral getting by the repetition of a series of operations, usually extending over three shifts, and so arranged that each shift completes its part of the sequence before the succeeding shift can begin operations.

2.107 Cycle of Operations — A series of several separate operations in a system of mining carried out in a predetermined order.

2.108 Dawson Miller — An integrated conveyor and milling disk used for continuous working of a stable hole or short face.

2.109 Dead Coal — Coal which is difficult to break down from the face, there being no natural forces assisting the process (*see also* Live Coal).

2.110 Deadwork (Bye Work) — Work that is not directly productive of mineral.

2.111 Debris — *See* Dirt.

2.112 Degradation — Inadvertent breakage of mineral in mining, handling, transportation or storage.

2.113 Depillaring — The process of winning coal or ore from pillars during the second working (*see* Pillar).

2.114 Depth of Cut — The distance by which the holing made by a coalcutter jib extends into the seam from the face of the coal. With power loaders, it is the thickness of web (*see also* Web).

2.115 Deputy — A qualified underground official in a mine of coal, stratified ironstone, shale or fireclay, with statutory responsibility for the safe and proper working of a district of the mine.

2.116 Deputy's District — That part of a mine specified by the manager to be in the charge of a deputy.

2.117 Development — Work done in a mine to obtain access to the mineral or to facilitate the opening out of new working areas and to block out ore.

2.118 Dint (Bate, Brush, Bottom Canch)

a) The place where material is removed from the floor of a roadway to increase height.

b) To cut away the floor to make height.

2.119 Dintheader — A mobile heading machine in which the cutting element consists of a wide boom carrying a series of cutting chains, or a continuous deck of hinged plates incorporating multiple pick holders.

2.120 Dip (Dock)

a) An underground roadway driven downhill, usually following the inclination of the strata.

b) The gradient of a dipping roadway.

2.121 Dip Face — A coal face advancing downhill.

2.122 Dip Workings — Working lying to the dip of any designated point in a seam.

2.123 Dirt (Debris, Gangue, Muck, Redd, Refuse, Rubbish, Spoil, Steriles) — Any waste material, such as rock or clay etc, associated with the mineral and extracted during mining operations.

2.124 Dirt Flinger — *See* Gum Flinger.

2.125 Dirt Tip (Bing, Pit heap, Tip) — *See* Spoil Heap.

2.126 Discontinued Workings — Working from which the extraction of mineral has permanently or temporarily ceased, but in which the roadways are still ventilated (*see also* Abandoned Workings).

2.127 District — One of the parts into which mine workings are divided for the purpose of supervision or ventilation.

2.128 Dook — *See* Dip.

2.129 Double Ended Machine — A longwall power loader having a cutting unit at each end.

2.130 Double Jib — An assembly of two cutter jibs, the chains of which are driven by sprockets mounted on the same shaft. The vertical separation of the two jibs is usually equal to the height of the coalcutter (*see* Fig. 3).

2.131 Double Shift Working — Mineral getting on two shifts per day.

2.132 Double Unit (Face) — Two adjacent longwall faces normally moving in line together and served by three roads, the centre road generally containing the main transport system.

2.133 Dress — To trim loose material from the face.

2.134 Drift

a) A roadway driven from the surface (*see also* 'Cross Measured Drift').

b) To make a roadway; to drive.

2.135 Drift Mine — A mine to which access is obtained by a drift driven from the surface.

2.136 Drivage — A roadway driven in the solid coal or stone.

2.137 Duckbill (Loader) — A self-loading shaker conveyor with a wide shovel head operating at floor level.

2.138 Duff — Fine Coal.

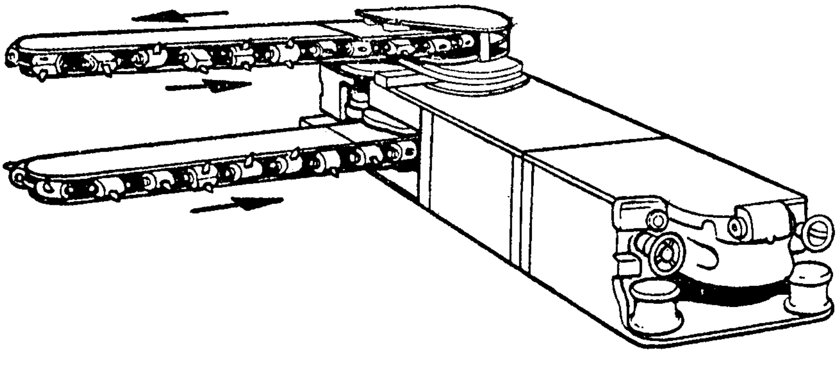


FIG. 3 DOUBLE JIB

2.139 Dummy Gate (Dummy Road) — A road which is formed but not maintained behind a longwall face, to provide material for building intermediate packs.

2.140 Dummy Road — *See* Dummy Gate.

2.141 Duplex Jib (Overslung Jib, Underslung Jib) — An arrangement of two cutter jibs so connected that the chain of the subsidiary jib is driven by the chain of the main jib by sprockets mounted in the nose of the jibs. The subsidiary jib may be overslung or underslung in relation to the main jib (*see* Fig. 4).

2.142 Dynamic Plough — *See* Activated Plough.

2.143 EBG (Elsewhere Below Ground) — A statistical term applied to all personnel working below ground other than at the face.

2.144 End Face (Headways Face) — A face advancing in approximately the same direction as the line of the main cleat.

2.145 Face (Coal Face, Working Face)

a) Strictly, any surface exposed by excavation for development or for the getting of mineral.

b) More generally, the supported area in the vicinity of the place at which mineral is worked.

2.146 Face Line

a) *See* Line of Face.

b) A mark drawn along the roof of a face to facilitate alignment.

2.147 Face Room — The total length or productive capacity of all faces available in a mine, from which coal can be won.

2.148 Face Width — The distance between the line of coal face and the waste edge.

2.149 Fast End

a) The dead end of a roadway.

b) That part of a rib side adjacent to a coal face (*see also* Loose End).

2.150 Fast Side — *See* Rib Side.

2.151 Fender — A very narrow pillar of coal left between adjacent workings.

2.152 Fill — To load mineral by hand.

2.153 Filler (Collier, Loader) — One who loads coal by hand.

2.154 Filling Shift — The shift on which mineral is loaded at the face.

2.155 First Working (Solid Working, Whole Working)

a) The driving of headings to extract coal and form pillars.

b) The first extraction in a seam which is worked in more than one layer.

2.156 Fixed Cut Ploughing — *See* Incremental Ploughing.

2.157 Flit — To move a coalface machine from one position of use to another when it is not operating as a producing unit.

2.158 Flight — A loading arm attached to the chain of a coalcutter or power loader.

2.159 Flight Loader

a) A longwall power loader having eccentrically mounted flights which sweep prepared coal on to a face conveyor.

b) A coalcutter which is adapted for loading by the addition of lights to the cutting chain.

2.160 Floor

a) The stratum immediately below a seam of coal or stratified mineral deposit.

b) The base of any excavation.

2.161 Floor Coal — *See* Bottom Coal.

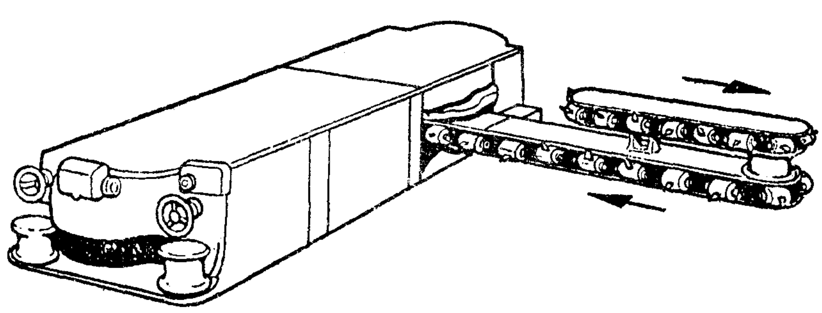


FIG. 4 OVERSLUNG (DUPLEX) JIB

2.162 Flushing

a) The displacement of loose material from the waste into the supported area.

b) The crumbling of the roof or sides around the supports in an excavation.

2.163 Footwall — The rock immediately underlying a mineral deposit (*see also* Hanging Wall).

2.164 Foreshift — The first morning shift.

2.165 Frame Cutter Loader — A coal winning machine whose cutter chain travels round a guide frame arranged in the vertical plane.

2.166 Frame Jib — A design of jib in which the cutter chain travels round a guide frame arranged in the vertical plane, and cuts out a profile in the seam (*see* Fig. 5).

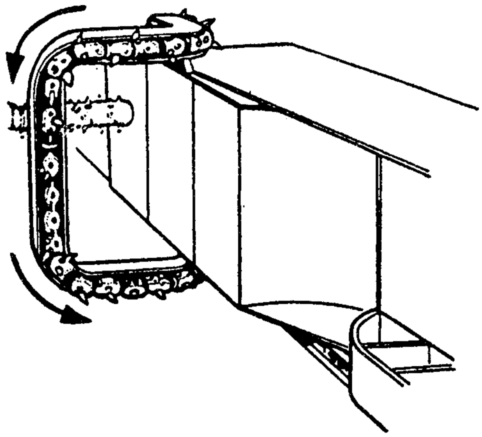


FIG. 5 FRAME JIB

2.167 Free Face — A surface of rock which is free to move when a force, usually that of an explosive, is applied to it.

2.168 Gallery — *See* Roadway.

2.169 Gangue — *See* Dirt.

2.170 Gate — *See* Gate Road.

2.171 Gate-End — The inbye end of a gate road.

2.172 Gate Road (Gate) — Strictly, a roadway connecting with a long wall face.

2.173 Gateside Pack — A pack built to support the gate road.

2.174 Gathering-Arm Loader — A loading machine having two moving arms which sweep broken material on to an integral conveyor.

2.175 Get — To break coal from the seam preparatory to loading.

2.176 Getter Loader — *See* Cutter Loader.

2.177 Gleithobel — A heavy duty high speed plough having articulated cutting assemblies at each end, and travelling along special ramp plates.

2.178 Goaf Edge — The leading edge of the area from which the supports have been withdrawn, behind the face.

2.179 Goaf (Gob, Waste) — Broadly, any part of a mine, excluding working places and roads, from which coal has been worked; more specifically that area behind a longwall face bounded by the last maintained line of supports and the gate road packs.

2.180 Goaf Road — *See* Scouring.

2.181 Gob

a) *See* Goaf.

b) To stow, in the goaf, material which has been removed from the face but which has little economic value.

c) To stow or pack a road with dirt.

2.182 Gob Road — *See* Scouring.

2.183 Grade

a) Inclination,

b) To bring to a predetermined gradient, and

c) Quality of mineral.

2.184 Grade Control — The blending of mineral to give a product a predetermined quality.

2.185 Gum Flinger (Dirt Flinger, Gum Stower) — A gummer which throws the cuttings into the goaf.

2.186 Gummer

a) A device, attached to a coalcutter, which deposits behind the machine the cuttings ejected from the cut.

b) A device attached to and driven by an armoured flexible conveyor drive head which removes fine material deposited under the delivery sprockets.

2.187 Gummer Bar — A metal bar attached to a coalcutter and extending into the cut behind the cutter jib to remove gummings from the cut.

2.188 Gummings (Cuttings, Kirvings, Scuftings) — The material produced by holing with a coalcutter.

2.189 Gum Stower — *See* Gum Flinger.

2.190 Gunite

a) Cement applied by a cement gun to the roof

a) and sides of a working or to the face of a stopping.
b) To spray with a cement gun.

2.191 Half Course — A road driven in the seam at an angle of about 45° to the full dip.

2.192 Half Face Heading System — *See* Half Heading System.

2.193 Half Heading System (Half Face Heading System) — A method of ripping at the end of a longwall advancing face in which the line of the rib-side of the face working coincides with the center line of the gate being driven, following the face. Half of the cross-sectional area at the ripping position adjacent to the face working resembles a normal ripping while the other half resembles a solid heading.'

2.194 Inspector of Mines — A person appointed under *Mines Act*, 1952 to inspect the mines. A crown official with statutory powers of inspection, investigation, inquiry and enforcement at mines and quarries.

2.195 Hanging Coal — Undercut coal which fails to fall.

2.196 Hanging Wall — The rock immediately overlying a mineral deposit (*see also* Footwall).

2.197 Hard Heading — *See* Stone Drift.

2.198 Harmonic Extraction — The working of one or more coal seams by means of a special layout and time sequence of extraction, the aim being to lower the overlying surface with a minimum of flexure, causing thereby a minimum of damage to the surface amenity.

2.199 Head — To excavate a road or narrow passage.

2.200 Heading

a) A roadway driven in the solid.
b) The operation of driving a roadway in the solid.

2.201 Headways Face — *See* End Face.

2.202 Heapstead — The surface works about a colliery shaft.

2.203 Heave (Lift) — Upward movement of the floor.

2.204 Heavy Armoured Conveyor — *See* Armoured Flexible Conveyor.

2.205 Hew — To get coal by hand.

2.206 Hewer — *See* Collier.

2.207 Hole — To undercut a seam of coal by hand or machine.

2.208 Holing

a) A connection between two adjacent excavations.
b) *See* Cut.

2.209 Horizon

a) A nearly level tunnel driven out from the shaft in horizon mining.
b) Any system of cross cuts and laterals in horizon mining at an identified level.

2.210 Horizon Mining — A system of working inclined seams from nearly level cross cuts and laterals repeated at certain vertical intervals or horizons.

2.211 Hydraulic Mining — A method of winning mineral by washing it out with high pressure jets of water, and subsequently transporting it in flumes or pipes.

2.212 Impact Plough — *See* Activated Plough.

2.213 Impact Ripper — A ripping machine using a boom mounted impact unit to deliver repeated high energy blows at the ripping face by means of a reciprocating pick.

2.214 Inbye — A direction underground away from the main shaft or surface outlet.

2.215 Incline (Brae, Slant, Slope) — A roadway driven on a gradient.

2.216 Incremental Ploughing (Fixed Cut Ploughing) — A system of ploughing whereby, after the passage of the plough along the coal face, the face conveyor is advanced by a fixed amount, thus ensuring that the depth of cut taken by the plough is constant.

2.217 Insertion Plough — *See* Anbauhobel.

2.218 Inset — An opening or entry from a shaft to an underground roadway or chamber.

2.219 Inspector — *See* HM Inspector.

2.220 In the Solid — In unbroken rock or mineral which is *in situ*.

2.221 Jet Stower — A pneumatic stowing device, comprising a feeder conveyor and small hopper, the base of which is scoured by a compressed air jet.

2.222 Jib — *See* Cutter Jib.

2.223 Jib-In — *See* Sump-In.

2.224 Kerf — *See* Cut.

2.225 Kirvings — *See* Gummings.

2.226 Knock — *See* Sound.

2.227 Lacing — *See* Pick Lacing.

2.228 Lagoon — A tip consisting of refuse which is accumulated or deposited wholly or mainly in solution or suspension.

2.229 Landing

a) A shaft inset, at which cages or skips are loaded or unloaded.
b) The top, bottom or any intermediate junction with an inclined plane.

2.230 Large Coal (Round Coal) — Coal above an agreed size — usually 50 mm.

2.231 Lateral — A roadway, in horizon mining, of nearly flat gradient driven in the direction of strike of the Coal Measures.

2.232 Level

a) An approximately horizontal mine roadway.
b) A specific horizon in a mine shaft.

2.233 Level Course — A direction along the line of strike.

2.234 l.h.d.Vehicle -- A rubber tyred articulated vehicle capable of loading, handling and dumping operations.

2.235 Lie — The line, direction or bearing as of a vein or lode.

2.236 Lift

a) A slice taken off a pillar during pillar extraction.
b) *See* Bench.
c) *See* Heave.

2.237 Line Hose — The main hydraulic distribution hose between a power pack and the equipment it serves.

2.238 Line of Face (Face Line) — The position of a longwall face in relation to such features as the direction of roadways, cleat, dip of strata, etc.

2.239 Line Pan — A unit of armoured flexible conveyor structure normally 1.5 m long.

2.240 Link Bar — A roof bar capable of being joined to a similar roof bar by a coupling and locking arrangement.

2.241 Lip

a) The face and edge of a ripping in a roadway.
b) Any step in the floor or roof of a working.

2.242 Live Coal — Coal which can easily be won from the face because of a distribution of rock stresses within the strata caused by mining operations or by virtue of gas emission from the seam (*see also* Dead Coal).

2.243 Loader

a) *See* Filler.
b) *See* Bucket Loader, Gathering Arm Loader, and Power Loader.
c) The attendant at a loading station.

2.244 Loader Gate — The roadway in which coal is conveyed from a longwall face.

2.245 Lode — A vein or body of mineral, usually metallic ore, which differs from the country rock.

2.246 Longwall — A system of working coal in which the seam is extracted on a broad front or long face.

2.247 Loose End — That end of a longwall face which abuts previous workings.

2.248 Lype — A break in the strata, having a slicken sided face.

2.249 Main Gate (Mothergate) — The principal road from a longwall face along which coal is usually transported.

2.250 Main Road — A principal underground road in a mine along which mineral is transported.

2.251 Manager — The person, having statutory qualifications, appointed to be in charge of a mine.

2.252 Manhole — *See* Refuge Hole.

2.253 Manway — A small passage used as a travelling way.

2.254 Mechanical Stower — A machine for throwing stone to pack the waste, using fast moving belts or paddles.

2.255 Mine — An excavation or system of excavations for the purpose of working minerals involving the employment of persons below ground, it includes surface works, building and machinery used in the work of a mine, the treatment of the mineral and the removal of refuse.

2.256 Miner — Broadly, any person engaged in work in or about a mine (*see also* Continuous Miner).

2.257 Minidozer — A small hydraulically powered remotely operated bulldozer generally used to push into the packhole area dirt produced at face ripping.

2.258 Mining — The extraction of minerals from the earth's crust, either from underground excavations or opencast workings.

2.259 Mining Engineer — A person having professional qualifications in mining.

2.260 Mining Engineering — The search for mineral deposits; the planning and development of mine workings; and the extraction of mineral.

2.261 **Monitor (Hydraulic)** — A device for directing a jet or water at high pressure to break down mineral deposits.

2.262 **Mothergate** — *See* Main Gate.

2.263 **Mouth** — The surface opening of a shaft, adit or drift.

2.264 **Mouthing** — The entrance to an inset.

2.265 **MST** — Abbreviation for man-shifts per 1 000 tonne.

2.266 **Muck** — *See* Dirt.

2.267 **Mucker** — A machine for loading dirt.

2.268 **Mucking Machine** — A machine for loading dirt.

2.269 **Mucking Out** — The operation of loading out broken material in roadways, shafts etc.

2.270 **Multi Jibs** — Three or more jibs arranged to cut out substantially the full section of the seam (*see* Fig. 6).

2.271 **Mushroom Jib** — A horizontal jib at the end of which a vertical cutting bollard is mounted to provide a shear cut (*see* Fig. 7).

2.272 **Narrow Work** — Driving roadways or rooms in coal.

2.273 **Nucleonic Steering** — Automatic horizon control of a power loader by means of a radioactive sensor reacting against floor or roof of seam.

2.274 **OMS** — Abbreviation for Output per Man-shift.

2.275 **OMY** — Abbreviation for Output per Man-year.

2.276 **On Bord (Bordways, Bord, Working On)** — Advancing at right angles to the line of main cleat.

2.277 **Oncost Work** — *See* Backbye Work.

2.278 **On End** — Advancing in the same direction as the line of main cleat.

2.279 **Opencast** — A working in which the mineral is exposed by removing the overburden, not being a shaft or an excavation which extends below super jucent ground.

2.280 **Ore** — A mineral bearing rock of economic value.

2.281 **Outboard Arm** — An arm fitted to a shearer, capable of allowing the drum to cut beyond the end of the armoured flexible conveyor.

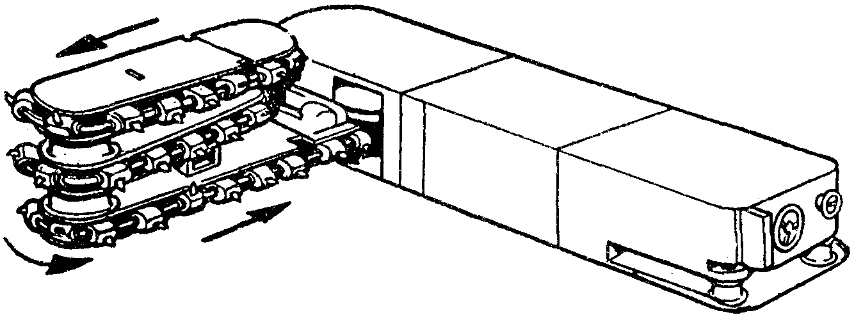


FIG. 6 MULTI (TRIPLEX) JIB

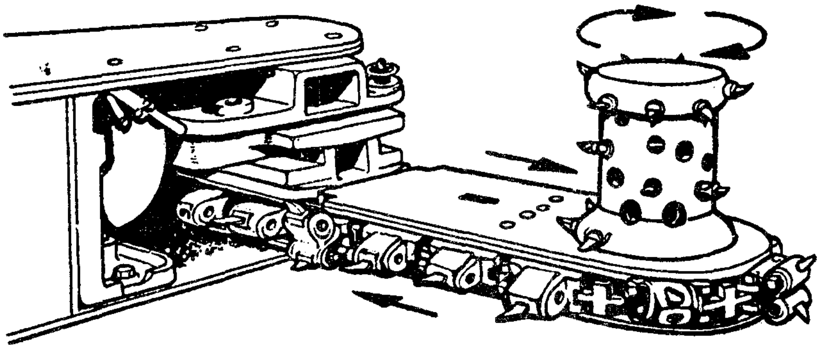


FIG. 7 MUSHROOM JIB

2.282 Outbye — A direction underground towards the main shaft or surface outlet.

2.283 Overburden — Surface material overlying a mineral deposit.

2.284 Overcut — To cut by machine at or near roof level in a seam.

2.285 Overcutter — A cutter which has an elevated jib to cut at or near roof level.

2.286 Overman (Oversman) — An official of a mine, in rank between the under manager and the deputy.

2.287 Overslung Jib — *See* Duplex Jib, and Fig. 4.

2.288 Oversman — *See* Overman.

2.289 Pack — In a long wall face, a stone support built in the goaf or at a roadside to resist strata movement.

2.290 Panel — An area of mineral worked within predetermined boundaries.

2.291 Panel System — A method of working whereby the workings of a mine are divided into blocks, surrounded by barriers of solid mineral or strata or artificial material with only minimum necessary roads.

2.292 Pan Shifter (Pan Turner) — One employed in dismantling and advancing a face conveyor.

2.293 Pan Turner — *See* Pan Shifter.

2.294 Panzer Conveyor — *See* Armoured Flexible Conveyor.

2.295 Percussive Plough — *See* Activated Plough.

2.296 Pick

a) A pointed hand tool for the breaking down of minerals.
b) *See* Cutter Pick and Pneumatic Pick.

2.297 Pick Box — A component of a cutting unit which firmly holds the cutter pick.

2.298 Pick Lacing (Lacing) — The arrangements of picks in the cutting unit of a coal getting machine.

2.299 Pillar — A block of coal or mass of ore formed and left during development, but normally extracted wholly or partially during the second working (*see also* 'Depillaring').

2.300 Pillar and Stall — *See* Bord and Pillar.

2.301 Pilot Heading

a) An exploratory roadway.
b) A small preliminary driveage, subsequently enlarged.

2.302 Pit

a) A colliery.
b) A mine shaft.

2.303 Pit Bank (Pit Brow) — The decking level at the surface.

2.304 Pit Bottom (Shaft Bottom)

a) The lowest shaft inset to which access can be gained by winding.
b) The roadway network in the vicinity of an inset from which men or minerals are normally wound.

2.305 Pit Brow — *See* Pit Bank.

2.306 Pit Head (Pit Top) — The colliery surface.

2.307 Pit Heap — *See* Dirt Tip.

2.308 Pit Top — *See* 'Pit Head'.

2.309 Planer — A shearer loadfer fitted with a vertical, triangular cutter jib in place of a drum and used for longwall face end working.

2.310 Plough

a) *See* Coal Plough.
b) A wedge shaped component of a longwall power loader, used to load loose coal on to a conveyor.
c) A deflector plate placed at an angle across a conveyor to remove the material being carried.

2.311 Pneumatic Pick (Pick) — A compressed-air operated percussive hand tool for breaking mineral or rock.

2.312 Pounce — An early symptom of weighting.

2.313 Powered Support — A roof support which is set, released and advanced by mechanical energy.

2.314 Power Loader — Strictly, a machine for loading mineral. More commonly, any longwall cutter loader.

2.315 Power Pack — A motor pump combination for producing power for hydraulic equipment.

2.316 Pre-Cutting — The operation of mechanically holing the coal seam in advance of the web about to be stripped.

2.317 Prop — An individual straight support member set between the roof and floor.

2.318 Prop Free Front Face — A longwall face in which props are not normally set between the conveyor and the coal.

2.319 Raise — A vertical or inclined shaft which has been driven upwards.

2.320 **Ram Packer** — A packing device situated at the face ripping of an advanced longwall face which employs a hydraulically driven ram to move and compact ripping dirt into a gate side pack.

2.321 **Ramp Plate**

a) An inclined plate fixed to the face side of a heavy armoured conveyor.

b) Any inclined plate used to assist loading operations.

2.322 **Ranging Arm** — A mounting arm for a shearer cutting drum, arranged in line with the machine and pivoted so as to permit vertical movement of the drum.

2.323 **Ranging Drum Shearer** — A shearer loader with cutting drum mounted on a pivoted arm enabling the cutting horizon to be varied during machine level.

2.324 **Ranging Jib** — An overcutter jib mounted on an adjustable turret (*see also* Turret Jib) (*see* Fig. 8).

2.325 **Ranging Outboard Arm** — A mounting arm for a shearer cutting drum offset from and parallel to the body of the machine and pivoted so as to permit vertical movement of the drum.

2.326 **Rapid Plough** — A plough which is hauled quickly along the face, taking off a thin slice of coal.

2.327 **Recover** — To restore to a working condition a mine or a part of a mine that has been damaged by explosion, fire, water, or other cause.

2.328 **Redd** — *See* Dirt.

2.329 **Refuge Hole (Manhole)** — An excavation at the side of a roadway in which persons can shelter while vehicles are passing.

2.330 **Refuse** — *See* Dirt.

2.331 **Reisshakenhobel** — A slow speed plough having an arm projecting under the armoured flexible chain conveyor to which haulage chains, passing through special spill plates on the gaof side of the conveyor, are attached.

2.332 **Remote Haulage** — A haulage unit which does not form an integral part of the power loader and is usually situated at one end of the face.

2.333 **Repair** — To restore, by enlarging its cross-section and replacing damaged supports, an excavation which has been distorted by strata movement.

2.334 **Retreating Longwall Face** — A face which advances in a direction opposite to that followed by the previously driven access roads.

2.335 **Retreating System** — A system of mining in which roads are driven in the coal seam to predetermined boundaries and panels or pillar are extracted in the contrary direction.

2.336 **Rib (Rib Side, Fast Side)** — The solid coal exposed at the end of an advancing face.

2.337 **Rib Side** — *See* Rib.

2.338 **Rip (Brush, Top Caunch)** — To cut or blast down the roof to make height.

2.339 **Ripper** — A man who rips.

2.340 **Ripping** — The place at which the roof other than the mineral roof is brought down to make height.

2.341 **Rise Face** — A face advancing uphill.

2.342 **Rise Workings** — Workings lying to the rise of any designated point in a seam.

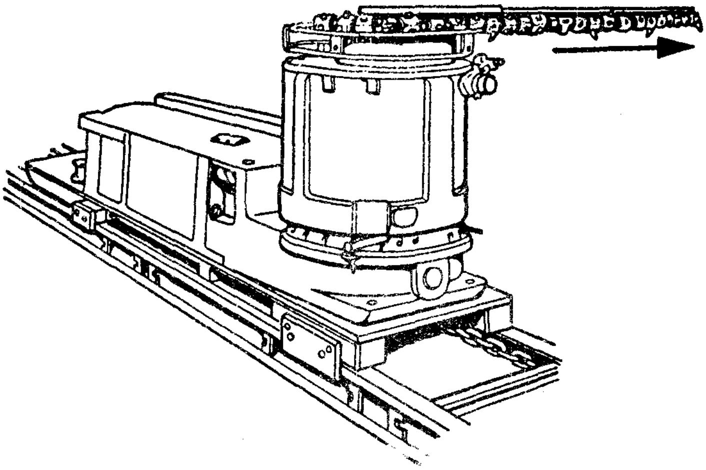


FIG. 8 RANGING JIB AND TURRET JIB

2.343 **Road** — *See* Roadway.

2.344 **Roadhead** — That part of a face which forms or is in line with a roadway and which lies between the last permanent support in that roadway and the face.

2.345 **Roadheader** — A mobile cutting and loading machine with fixed or telescopic boom carrying a rotary cutting head which excavates the full cross-section of the roadway.

2.346 **Roadman (Rolleyway Man)** — One who maintains the track and generally ensures the efficiency of the haulage system.

2.347 **Roadway (Road Gallery)** — Any underground passage driven and maintained to provide access to the mineral deposit or for haulage or ventilation purposes, or for men to travel in the mine.

2.348 **Robbing Pillars** — Reducing the size of pillars by extracting mineral from one or more sides.

2.349 **ROLF** — Abbreviation for 'remotely operated longwall face'.

2.350 **Rolleyway Man** — *See* Roadman.

2.351 **ROM** — *See* Run of Mine.

2.352 **Roof Coal** — That part of a seam of coal which may be left to form a roof under which supports can be set.

2.353 **Roof Top**

a) The rock immediately above a seam of coal or mineral deposit.
b) The ceiling of any underground excavation.

2.354 **Room** — A roadway driven in coal in bord and pillar mining when forming pillars.

2.355 **Room and Pillar** — *See* Bord and Pillar.

2.356 **Round Coal** — *See* Large Coal.

2.357 **Rubbish** — *See* Dirt.

2.358 **Run of Mine (ROM)** — The product of a mine before sorting or cleaning.

2.359 **Running Ground** — In cohesive ground through which an excavation can be maintained only by complete peripheral support.

2.360 **Safety Pillar** — *See* Shaft Pillar.

2.361 **Scouring (Goaf Road, Gob Road)** — A roadway driven through goaf.

2.362 **Scraper Loader (Slusher)** — A mechanical device for loading or packing broken material by which an open ended bucket is drawn to and fro through the pile with main and tail ropes.

2.363 **Scrapper Box Loading** — A method of transporting coal along a coalface in which a series of box-like structures is constrained to move to and fro along the face, gathering the coal and conveying it to the gate end (cutting knives may or may not be fitted to the boxes to scrape off some depth of coal at each pass).

2.364 **Scuftings** — *See* Gummings.

2.365 **Second Working (Broken Working)** — The partial or total extraction of coal pillars in bord and pillar mining.

2.366 **Self Advancing Support** — *See* Powered Support.

2.367 **Service Road** — Usually a materials' supply road.

2.368 **Shaft** — A vertical or inclined excavation of limited cross section in relation to its depth, made to provide access to underground workings.

2.369 **Shaft Bottom** — *See* Pit Bottom.

2.370 **Shaft Pillar (Safety Pillar)** — Mineral left unworked around a shaft, to protect it against damage caused by strata movement and to protect surface structures around the shaft against damage due to subsidence.

2.371 **Shear**

a) To make vertical or inclined cuts in a mineral deposit, to facilitate extraction.
b) To remove a web of coal with a shearer loader.
c) The slice of coal removed by a longwall power loader.
d) *See* Strip.

2.372 **Shearer Disc** — *See* Shearer Drum.

2.373 **Shearer Drum (Shearer Disk)** — The drum (or connected disks) fitted with picks which form the cutting element of a shearer loader.

2.374 **Shearer Loader (Anderton Shearer Loader)** — A mining machine which cuts the coal by means of rotating disks or a drum mounted on a horizontal shaft, and loads the coal on to a conveyor.

2.375 **Shear Jib** — A cutter jib usually mounted so that the plane of the cut is normal to the seam.

2.376 **Short Face Miner** — *See* Stable Hole Machine.

2.377 **Short Face Ranger** — A coal cutting and loading machine with ranging head or heads, suitable for excavating in headings or short faces.

2.378 **Shortwall** — A short coalface.

2.379 **Shortwall Cutter (Shortwaller)** — A coalcutter designed for use on a shortfall face.

2.380 Shortwaller — *See* Shortwall Cutter.

2.381 Shovel Loader — *See* Bucket Loader.

2.382 Shuttle Plough (Activated Ramp Plates) — A chain hauled gathering plough which operates over successive short sections of a longwall face, positioned on the face side of an armoured flexible conveyor and used behind the main power loader to load small coal and spillage.

2.383 Side — The exposed surface of an underground excavation between the roof and the floor. (The term embraces the working face only in accident classification.)

2.384 Single Ended Machine — A power loader on which the cutting unit is located at one end of the machine (*see also* Double Ended Machine).

2.385 Sinker

a) One engaged in shaft sinking.
b) A heavy rock drill used in shaft sinking.

2.386 Slack — Small coal.

2.387 Slant Incline Slope

a) An inclined roadway driven in the seam.
b) An inclined cross measures drift.

2.388 Slit — A small connecting roadway.

2.389 Slope — *See* 'Incline'.

2.390 Slush — To scrape and move dirt with a rope hauled bucket or scraper box.

2.391 Slusher — *See* Scraper Loader.

2.392 Snake — To move an armoured conveyor forward, section by section, without dismantling, by the use of power operated rams.

2.393 Solid, In the — *See* In the Solid.

2.394 Solid, Working, Off the — Extraction of coal in a place having only one free face (q.v.).

2.395 Solid Working — *See* First Working.

2.396 Sound (Chap, Knock) — To tap on the strata to ascertain its degree of stability, or estimate the thickness of strata between two excavations.

2.397 Spallings — Pieces of rock which break and fall from the roof or sides of an excavation.

2.398 Spiling — The driving of supports ahead of the face when mining through running ground.

2.399 Spoil — *See* Dirt.

2.400 Spoil Bank — An accumulation of material progressively deposited in the void left by opencast mining.

2.401 Spoil Heap (Bing, Dirt Tip, Pit Heap, Tip) — A tip consisting of refuse which is accumulated or deposited wholly or mainly in a solid state.

2.402 Stable Elimination, Deprecated — Any system of working at the end of a longwall face which obviates the need for the stables.

2.403 Stable Hole — *See* Stable.

2.404 Stable Hole Machine (Short Face Miner) — An integral power loader and conveyor which is designed for operation on a short length of face, usually stable holes.

2.405 Stable (Stable Hole) — The space excavated to form a buttock on a longwall face from which a coalcutter or power loader can start its run.

2.406 Staker — *See* Stell Prop.

2.407 Stall — A road or working place in a coal seam.

2.408 Stamp — To make a hole in the strata for setting a support or anchor.

2.409 Staple Pit (Staple Shaft) — A shaft connecting two or more levels and having no direct outlet to the surface (*see also* Raise and Winze).

2.410 Staple Shaft — *See* Staple Pit.

2.411 Static Haulage Chain — A stationary chain situated on a longwall face along which a power loader hauls itself.

2.412 Stell Prop (Staker) — A strut used for anchoring a ram or piece of machinery.

2.413 Stent — *See* Stint.

2.414 Steriles — *See* Dirt.

2.415 Sticky Tops — *See* Sticky Coal.

2.416 Stone Drift (Crut, Hard Heading, Tunnel) — A roadway driven in rock other than coal.

2.417 Stoop — To extract a coal pillar.

2.418 Stoop and Room — *See* Bord and Pillar.

2.419 Stope — A main extractive working in an ore body.

2.420 Stoper — A light percussive drill incorporating a pneumatic cylinder to provide support and thrust while drilling steeply inclined holes.

2.421 Stowbord — An old roadway used for stowage of waste material or dirt.

2.422 Stowing — The filling of the goaf with material other than produced by caving.

2.423 Strike Face — A face advancing in the direction of the line of strike.

2.424 Strip

a) To work off a web or portion of coal along the face.
b) To mine coal alongside a fault, barrier or goaf edge.
c) The slice of coal removed by a longwall power loader.

2.425 Strip Pack — A pack of limited width in the waste behind a longwall face.

2.426 Stripper — *See* Collier.

2.427 Sump-In (Jib-In) — To break into the solid coal with a cutter jib prior to cutting along the face.

2.428 Sumping Drum — A shearer drum fitted with additional picks on its face side, to enable it to be advanced into the coal to the required depth of web.

2.429 Supply Gate — A roadway generally used when taking materials to the face.

2.430 Swan-Neck Jib (Cranked Jib) — A jib used with a coalcutter mounted on an armoured flexible conveyor and shaped to permit a horizontal cut to be made at or near floor level (*see* Fig. 1).

2.431 Swelly — *See* Swilly.

2.432 Swilly (Swelly) — A trough in a coal seam or roadway.

2.433 Sylvester — A hand operated rack and lever pulling device mainly used for withdrawing supports.

2.434 Tail Gate — A gate road at the opposite end of a longwall face to the main gate.

2.435 Take — The extent or area of a mine property.

2.436 Thirling — A cut through from one excavation into another.

2.437 Tip — An accumulation of deposit or refuse, whether in a solid state or in a solution or suspension, at the surface of a mine or quarry. The term encompasses both spoil heaps and lagoons (q.v.).

2.438 Top — *See* Roof.

2.439 Top Caunch — *See* Rip.

2.440 Tops — The upper part of a coal seam, separated from the rest of the seam by a natural parting and sometimes left to form a roof.

2.441 Trackless Mining — Mechanized mining system using mobile equipment which does not require rail tracks.

2.442 Travelling Road — An underground roadway along which workmen go to and from their working places.

2.443 Treble Shift Working — Mineral getting on three shifts per day.

2.444 Trepanner — A longwall power loader, usually double ended, the main cutting element of which is a trepanning wheel equipped with cutting tools.

2.445 Trepan Shearer — A longwall power loader, which combines the features of a trepanner and a shearer loader.

2.446 Triplex Jibs — Three cutter jibs so connected that the chains of the two subsidiary jibs are driven by the chain of the main jib by sprockets mounted in the nose of the jibs (*see* Fig. 6).

2.447 Tunnel — *See* Stone Drift.

2.448 Turnover — *See* Unit Advance.

2.449 Turret Coalcutter — A coalcutter on which the height of the cutter jib can be varied.

2.450 Turret Jib (Ranging Jib) — An overcutting jib so mounted that the height of the cut above floor level can be varied (*see* Fig. 8).

2.451 Twin Jibs — Two cutter jibs, the chains of which are driven by sprockets mounted on the same shaft. The jibs are mounted adjacent to each other to give a kerf of twice the normal thickness.

2.452 Undercut — To undermine a seam by making a narrow cut at or near floor level.

2.453 Underframe — A base structure for a power loader which enables it to ride along an armoured flexible conveyor.

2.454 Underframe (Pitch Steering Type) — A shearer underframe having means for tilting the power loader about a transerverse axis.

2.455 Underframe (Roll Steering Type) — A shearer underframe having means for tilting the power loader about a longitudinal axis.

2.456 Underframe (Sliding Type) — An underframe designed to permit a shearer to slide on to the conveyor head frame.

2.457 Underlung Jib — *See* Duplex Jib and Fig. 4.

2.458 Unit Advance (Turnover) — The distance which a roadway or a working face moves forward in one cycle of operations.

2.459 Universal Arc Shearer — *See* Arc Shearer.

2.460 Vend — The saleable mineral product from a mine.

2.461 Virgin — Unworked and undeveloped.

2.462 Volley Firing — The firing of a large number of simultaneous shots in strata liable to outbursts, for the purpose of reducing the possibility of danger from this hazard.

2.463 Waffler — An arc wall cutter which uses the chains for both cutting and loading.

2.464 Waste

a) The goaf.

b) Any unsupported area behind a longwall face which is behind the last maintained line or supports and which lies between the packs.

2.465 Web — The width of a cut or slice of coal removed from the face (normally by a power loader) in one cycle of operations.

2.466 Whole Working — *See* First Working.

2.467 Winning

a) The several operations involved in breaking the coal from the solid and loading it for transport underground.

b) Excavations made during development.

2.468 Winze — A vertical or inclined staple pit which has been drive downwards.

2.469 Workable — Economically worth working.

2.470 Worked Out Area — An area from which the workable mineral has been extracted.

2.471 Working Face — *See* Face.

2.472 Working Place — Any place in which men are engaged in a regular activity.

2.473 Workings — Any underground excavation; usually restricted in mining to apply to the vicinity of the working face but sometimes used in a broader sense to mean all developments below ground.

2.474 Working Thickness — The height of the working face.

2.475 Workmen's Inspection — An inspection of mine workings provided for by statute and carried out by or on behalf of the workmen.

Indian Standard

MINING — GLOSSARY OF TERMS

PART 8 SHAFTS AND ASSOCIATED EQUIPMENT

1 SCOPE

This standard (Part 8) covers the terms relating to shafts and associated equipment used in the field of mining.

2 TERMS AND DEFINTIONS

2.1 A.C. Winder — *See* Winder Electric Drive.

2.2 Adjusting Links — Links, plates or blocks of various lengths used to adjust the overall length of suspension gear.

2.3 Apron Conveyor — A plate type conveyor carrying mineral between a storage bunker and skip measuring pockets at an underground loading station, or at a pit top carrying mineral from a tippler to a main transporting conveyor.

2.4 Artificial Landing — A horizon above the shaft bottom or lowest landing place selected for reasons of safety to enable running tests to be carried out on the winding engine by adjustment of the positional relationship between the shaft conveyances, control equipment and automatic contrivance, during the normal winding cycle.

2.5 Automatic Contrivance — The safety apparatus which automatically shut off power and applies brakes under any one of the following circumstances:

a) If the hoisting speed exceeds the permissible speed at any point,
b) If the operator fails to apply the brakes at the appropriate time and right at the end of travel,
c) If over winding occurs,
d) If the operator fails to reverse the hoist after the shaft conveyance has reached the landing of limit or travel, and
e) If the power fails.

2.6 Automatic Winder Control — *See* Winder Control System.

2.7 Backing Boards (Backing Deal) — The temporary timber lining erected against the walls of sinking shaft.

2.8 Backing Out — The operation of reversing a conveyance out of an over wind.

2.9 Back Wall Injection — The injection of grout, or other sealing or consolidating compound, behind the finished lining of a shaft to seal off residual water and/or to preserve the lining.

2.10 Banking Level — *See* Pit Bank.

2.11 Banksman — The person in charge of signalling at the shaft top and of loading and unloading shaft conveyances.

2.12 Bennett Catches — *See* Over Wind Catches.

2.13 Bio-Cylindro-Conical Drum — A winder drum on which the rope is carried on two parallel or nearly parallel sections of drum of different diameter interconnected by a conical section on which is carried in a scroll.

2.14 Bottom Pillar — *See* Shaft Pillar.

2.15 Bowk — *See* Kibble.

2.16 Brake Engine — A steam, hydraulic or pneumatically powered device designed to release, and in some systems to apply, the mechanical brakes of a winder.

2.17 Bridle Chains — *See* Suspension Chains.

2.18 Bucket — A large steel bucket used to remove debris and to transport men and materials in shaft sinking and in special circumstances to facilitate examination of a shaft.

2.19 Buffer Beams (Bumper Beams, Bumping Beams) — In friction winding, beams fitted in the head frame and the shaft, at the limits of travel, to stop an over wound conveyance (volumetric fragment Landing Baulks).

2.20 Buffer Ropes — *See* 'Rubbing Ropes'.

2.21 Bunton — One of a series of horizontal beams set at intervals across a shaft to support rigid guides, cables and pipes and, in rectangular shafts, to act as struts.

2.22 Cactus Grab — A mechanical loading device with petal-shaped loading arms for removing rock debris from a sinking shaft.

2.23 Cage — A frame, generally constructed of steel or wrought iron, provided with a roof, sides and one or more floors or decks, for conveying men, mine cars or tubs, or materials, in a shaft.

2.24 Cage Hangers — Vertical members in the framework of a cage to which the cage hoops are attached and which transmit the load to the suspension gear.

2.25 Cage Hoop — Part of a shaft conveyance, being a horizontal continuous stay supporting the case hangers and forming the main support for the conveyance decks.

2.26 Cage or Conveyance In-Line Valve — A control valve sited at a docking level in the shaft and operated by the shaft conveyance to initiate the sequence of hydraulic or pneumatic decking operations.

2.27 Caisson Sinking — A method of sinking through unconsolidated wet surface deposits, whereby a shaft lining consisting of cast-iron tubbing built up ring by ring at the surface is arranged to sink down the shaft, the ground within the lining being excavated from an air-tight chamber having a pressure higher than atmospheric.

2.28 Cappel — The complete attachment fitted at the end of a rope by means of which the rope is coupled to any apparatus. Various types are as follows:

a) *Straight Friction Wedge Type* — A capping in which the rope is compressed between friction wedges, bands being driven over the hairpin shaped loop of the capping to produce the compressive force (*see* Fig. 1).

b) *White Metal Type* — A capping in which the rope is secured in white metal in a tapered socket (*see* Fig. 2).

A safety platform used in shaft sinking and suspended just below the level of the working scaffold.

A permanent platform below the lowest normal working level of the shaft.

2.29 Catches — *See* Keps.

2.30 Cathead — A frame extension above the headgear to facilitate the installation and servicing of the headgear sheave.

2.31 Cementation Process — A method of sealing off water-bearing strata by the injection of cement grout through boreholes (*see also* Back Wall Injection and Pre-Injection).

2.32 Cleat — A clamp used for fixing cables and pipes in a shaft.

2.33 Clivvy Hook — A safety hook, used to attach a winding rope to a kibble, in which the mouth of the hook is closed normally by a guard.

2.34 Closed Loop Control — *See* Winder Control System.

2.35 Clutched Drum Winder — A winder having two drums with one or both drums clutched for facilitating quick adjustment of ropes to compensate for initial stretch or to hoist from any level for multilevel operation.

2.36 Coffering — The lining of a shaft with concentric layers of brickwork, the spaces between being packed with cement or puddled clay to make a watertight lining.

2.37 Collar — *See* Shaft Collar.

2.38 Consecutive Decking — The operation of bringing decks of a multi deck cage at a single decking level for the purpose of loading and unloading.

2.39 Control System — *See* Winder Electric Drive.

2.40 Converter Fed Winder — *See* Winder Electric Drive.

2.41 Counterweight — A weight connected into a single conveyance winding system to reduce the out-of-balance static loads within the system.

2.42 Creep (Rope) — *See* Rope Creep.

2.43 Creep Speed — A low winding speed normally employed just prior to stopping.

2.44 Crib — *See* Curb.

2.45 Curb (Crib, Walling Crib) — Ring of iron, timber or concrete set so as to form the foundation for a section of walling in a sinking shaft.

2.46 Cyclic Control — *See* Winder Control System.

2.47 Cylindro-Conical Drum — A winding drum on which the rope is carried partially in a scrolled conical section and partly on a parallel section of drum, usually of the same diameter as the largest diameter of a scroll.

2.48 Decking — The operation of load and unloading of a cage. The operation of bringing the decks of a cage to a decking level for the purpose of loading and unloading.

2.49 Decking Level — Of a single deck cage or decks of a multi-deck cage are brought for the purpose of loading and unloading.

2.50 Decking Ram — A powered device to push mine cars or tubs into a cage.

2.51 Deflection Sheaves (Guide Sheaves) — Sheaves used in tower mounted friction winders to deflect the winding ropes to the required positions in the winding shaft when the diameter of the driving sheave of drum exceeds the required distance between the rope centers.

2.52 Detaching Bell or Plate — The device in the headgear which operates the detaching hook in the

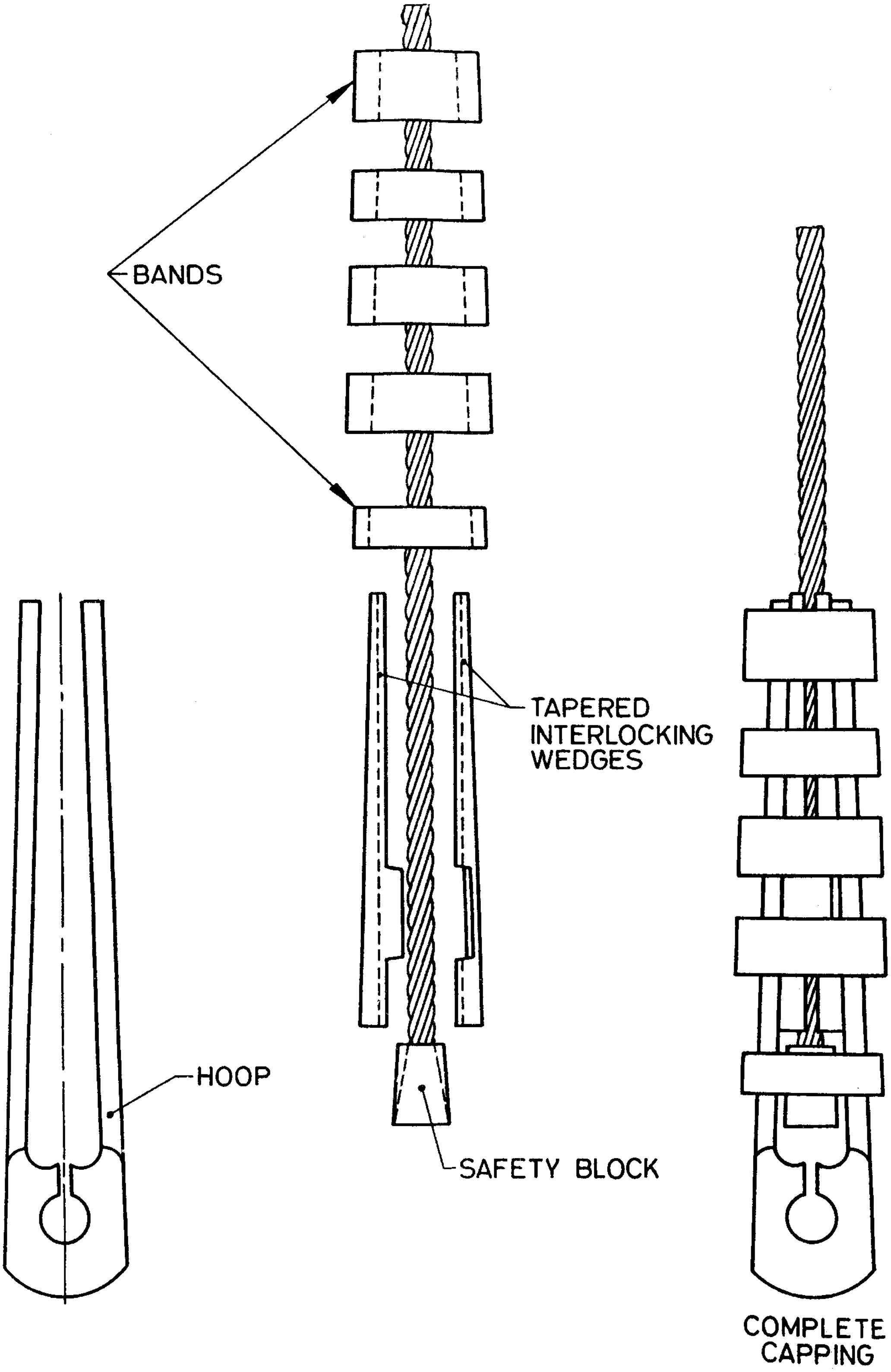


FIG. 1 STRAIGHT FRICTION WEDGE TYPE ROPE CAPPING

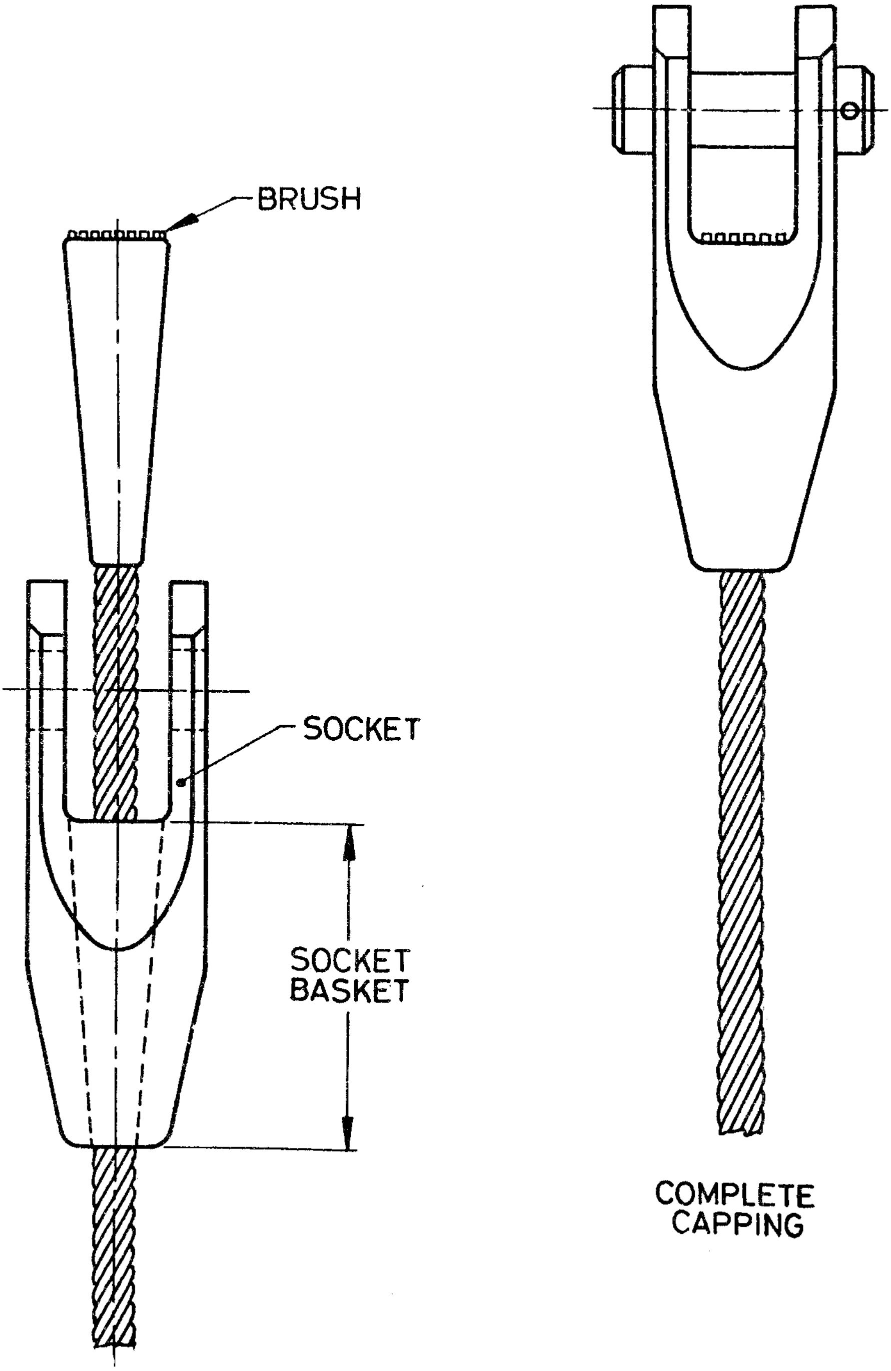


FIG. 2 WHITE METAL TYPE ROPE CAPPING

event of an over wind, and from which the detached conveyance is suspended after the winding rope is detached from the safety hook.

2.53 Detaching Hook — A mechanical contrivance located between the capping and the conveyance such that in the event of an over wind the ascending conveyance is detached from the winding rope and is left suspended in the head frame.

2.54 Downcast Shaft (DC) — A shaft through which fresh air is drawn or forced into a mine.

2.55 Draw — *See* Wind.

2.56 Drop Shaft Sinking — A method of sinking through unconsolidated surface deposits whereby shaft walls of cast iron tubbing, brickwork or concrete, are built above the ground and arranged to sink down vertically, the ground within the walls being excavated in the process.

2.57 Drum Winder (Drum Hoist) — A type of hoist that uses drum/drums, where one end of the rope/ropes is anchored to and coiled over it.

2.58 Equalizing Plate — *See* Spreader Plate.

2.59 Eye — The top or mouth of a shaft.

2.60 Fleet Angle — An angle between the centre line of the headgear sheave at right angles to the axis of the drum and the rope when it is at the end of its transverse travel on the drum (*see* Fig. 3).

2.61 Flexible Guides — *See* Rope Guides.

2.62 Freezing Process — A method of consolidating water bearing strata, to prepare it for shaft sinking, in which a freezing agent (usually brine) is circulated through suitably disposed boreholes drilled into the strata around the site of the shaft.

2.63 Friction Hoist — A type of hoist that uses the principle of friction to drive one or more winding ropes that pass over the driving sheave/drum from one conveyance to another or to a counterweight.

2.64 Friction Tread (Rope Tread, Tread) — The lining of a driving drum or sheave on which the rope(s) of a friction winder run(s).

2.65 Garland (Water Garland) — A channel fixed around the lining within a shaft in order to catch the water draining down the shaft walls and conduct it by pipes or water boxes to a lower level.

2.66 Gravity Winding — A system of winding, using out of balancing masses, now widely adopted to

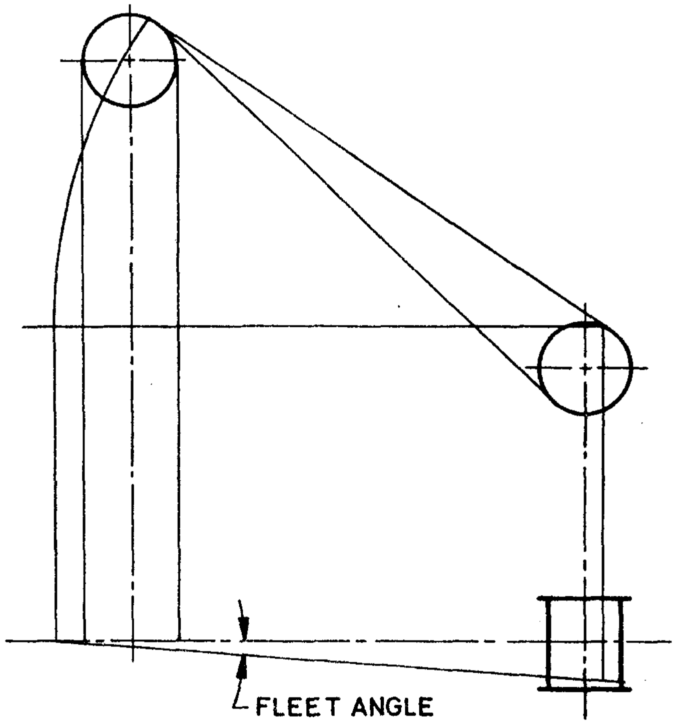


FIG. 3 FLEET ANGLE

provide emergency egress from a mine, in case of power failure.

2.67 Grooved Drum — A winding drum on which coiling of a rope is controlled by grooving on the whole or part of the surface of the barrel.

2.68 Guide Rollers — *See* Shaft Guide Wheels.

2.69 Guide (Shaft Guide) — An arrangement of girders, rails, wooden rods or ropes disposed in a shaft to restrict lateral movements of conveyances or counterweights.

2.70 Guide Sheaves — *See* Deflection Sheaves.

2.71 Guide Shoes — The attachments which constrain the conveyance to move along the guides.

2.72 Hangers — *S*-shaped hooks used to support the metal rings which retain the backing boards in sinking shaft.

2.73 Headgear (Head Frame) — The structure located over the shaft on which headgear sheaves are mounted.

2.74 Headgear Pulley — *See* Headgear Sheave.

2.75 Headgear Safety Catches — *See* Over Wind Catches.

2.76 Headgear Sheave (Headgear Pulley, Head Sheave) — The sheave in the headgear over which the winding rope passes to a ground mounted winding engine.

2.77 Hoppit — *See* Kibble.

2.78 Inset — An opening or entry from a shaft to an underground roadway or chamber.

2.79 Keps (Catches) — Retractable support in a shaft on which the conveyance may rest.

2.80 Koepe Winder — A single or multi rope friction winder.

2.81 Landing — The pit bank or an inset in the shaft at which regular loading and unloading of shaft conveyance takes place.

2.82 Landing Platform — In drum winding, heavy timbers sometimes placed across the shaft and on which the cage rests at the lower end of the wind (Volcanic fragments buffer beams).

2.83 Lashing — The loading out of shaft debris.

2.84 Load Chains — Suspension chains of a shaft conveyance which carry load.

2.85 Low Landing — A decking position at ground level below the normal landing.

2.86 Meeting — The position in a shaft where the cages pass each other during winding operations.

2.87 Mouth — The surface entrance to a shaft, slope, drift or adit.

2.88 Mouthing — The entrance to an inset.

2.89 Multi-Layer Coiling — The practice of coiling a winding rope in more than one layer on a drum.

2.90 Onsetter — The person in charge of signalling and of loading or unloading conveyances at a shaft inset.

2.91 Open Loop Control — *See* Winder Control System.

2.92 Overlap Rope — A rope which commences coiling on a drum above the axis of the drum.

2.93 Over Wind — Unintentional over travel of a conveyance beyond the position of the normal decking level.

2.94 Over Wind Catches (Bennett Catches, Headgear Safety Catches) — Pawls or catches mounted on the headgear and designed to support the conveyance, independent of the suspension gear, in the event of over winding.

2.95 Over Wind Distance (Over Travel Distance) — The minimum amount of travel of the conveyance beyond the normal decking position before operation of the detaching hook or contact with the buffer beams.

2.96 Parallel-cum-Spiral Grooved Drum — A winding drum in which a continuous groove is formed, part of each turn being parallel to the drum cheek and part forming a helix between parallel positions.

2.97 Parallel Grooved Drum — A winding drum on which a number of separate grooves are each formed parallel to the drum cheek.

2.98 Pit Bank

a) The colliery surface.
b) The decking level at the shaft top.

2.99 Pit Bottom — The bottom of a shaft and all the equipment and roadways surrounding it.

2.100 Plat — The floor of a level at its intersection with the shaft.

2.101 Plug — A temporary stopping erected in a shaft to allow work to be carried out.

2.102 Pre-Injection — The injection of grout, or other sealing compound, into strata before the commencement of a particular length of shaft sinking so as to render the strata less permeable to water flow in the vicinity and thereby reduce the water flow into the shaft.

2.103 Raising — The process of excavating a shaft from the bottom upwards.

2.104 Rapper — A hammer operated by a pull wire to give audible signals in a shaft.

2.105 Receiver Guides — *See* Spears.

2.106 Retarders — Devices provided in the head frame and the sump to arrest an over wound conveyance or counterweight, particularly in friction winding systems.

2.107 Rider — A framework for steadying a kibble between two guides in shaft sinking.

2.108 Rigid Guides — Wooden or steel guides fixed in a shaft to prevent lateral movement.

2.109 Rope Creep — The small relative movement which occurs between the winding rope(s) and friction treads of a friction winder during normal winding operations due to unequal tensions in the rope ends.

2.110 Rope Creep Compensator (Synchronizer) — A device used in friction to correct the relative position winding of the automatic contrivance, depth indicator and other distance measuring equipment after rope creep has taken place.

2.111 Rope Guides (Flexible Guides) — Guides of steel wire rope which are freely hung from the head frame and fixed or weighted at the pit bottom for tensioning and used for guiding conveyances in vertical shafts.

2.112 Rope Tread — *See* Friction Tread.

2.113 Rubbing Ropes (Rubbing Guides) — Ropes hung in the shaft between the paths of the conveyances to prevent collision at the meeting.

2.114 Safety Block — In a wedge type capping a tapered white metal block at the end of the rope, used to detect movement of the rope between the wedges and to cause the wedges to grip the rope in the event of rope slip through the capping.

2.115 Safety Chains — The two slack chains connecting the spreader plate with the middle hangers on each side of the conveyance.

2.116 Scaffold — A working platform suspended during shaft sinking or repair.

2.117 Scaffold Bolts — Adjustable arms fixed to a scaffold platform to steady it during shaft walling operations.

2.118 Scaffold Winch — A geared winding engine, with one or more independently clutched and brake drums, for manoeuvring a scaffold in a shaft sinking.

2.119 Scrolled Drum — A winding drum barrel, having a spiral groove on its surface.

2.120 Shaft — A vertical or steeply inclined excavation, of limited width in relation to its depth, made to provide access to underground workings.

2.121 Shaft Collar — The initial foundations forming the mouth of a shaft.

2.122 Shaft Guide — *See* Guide.

2.123 Shaft Guide Wheels — Wheels mounted on a conveyance to constrain it to travel along the path of a rigid guide in a shaft.

2.124 Shaftman — A person employed in the inspection, maintenance and repair of shafts.

2.125 Shaft Mouth — The surface entrance of a shaft, slope, drift or adit (*see also* Eye).

2.126 Shaft Pillar — The area of mineral left unworked around the shaft to prevent damage to the shaft and surface buildings.

2.127 Shaft Sinking — The process of sinking or excavating a shaft.

2.128 Shaft Sump — The part of a shaft below the lowest winding level.

2.129 Simultaneous Decking — The operation of loading and unloading all decks of a multi-deck cage at decking level at the same time.

2.130 Sinker — A person engaged in the operation of sinking or excavating a shaft.

2.131 Sinking Shaft — A shaft in the process of being sunk or excavated.

2.132 Sink to — To excavate a shaft.

2.133 Skip — A shaft conveyance designed primarily for the bulk handling of mineral. It is also at times adopted for transport of men.

2.134 Skip Anti-Breakage Plate — A plate, usually hinge mounted within a skip in order to reduce degradation of material during loading.

2.135 Skip Guillotine Door — A door which is constrained to move vertically at the bottom of one side of a skip and through which the contents are discharged.

2.136 Skip Measuring Pocket — The structure or excavation used to predetermine the volume or weight of mineral and to position it for loading into a skip.

2.137 Slack Rope Detector (Slack Rope Indicator) — A device normally provided at the surface for use either to give warning of formation of slack rope above a descending conveyance, or to automatically bring the winding engine to rest.

2.138 Spears (Receiver Guide, Taper Guides) —

Wooden or steel guides tapered at the end to locate the conveyance at decking levels.

2.139 Spider — A bushed frame located in the bell of a sinking rider to control oscillation of the winding rope when the capping is below the scaffold. The frame is designed to collapse and pass through the detaching plate or bell in the event of an over wind.

2.140 Spiral Grooved Drum — A winding drum on which the groove is a continuous spiral so that the rope is coiled in a helix of constant angle.

2.141 Spreader Plate (Equalizing Plate) — A part of suspension gear which transmits loads from and interconnects two or more lower parts to one upper part.

2.142 Staple Shaft (Staple Pit) — A shaft connecting excavations at two levels below ground and having no surface outlet.

2.143 Sump — An underground excavation meant for the storage of water.

2.144 Supervisory Control — *See* Winder Control System.

2.145 Suspension Chains (Bridle Chains) — The chains forming part of the connection between a winding rope and the suspended load in a shaft.

2.146 Suspension Gear — The whole assembly of components used to connect a rope to the suspended load in a shaft.

2.147 Swinging Platform — *See* Hinged Platform.

2.148 Tail Rope — A continuous rope suspended from the underside of the conveyances, or conveyance and counterweight, in a winding system to reduce the effect of the out-of-balance rope weight in the shaft. It is primarily used on friction hoists to keep the proper tension rating.

2.149 Tail Rope Pulley — A pulley suspended in the loop of a balance rope to control undesirable movement of the balance rope, such as twisting.

2.150 Taper Guides — *See* Spears.

2.151 Tilting Platform, Swinging Platform — A platform which is pivoted at the shaft side to act as a bridge between the shaft side and the deck of a conveyance during loading and unloading operations.

2.152 Tower Winder — A winder mounted on a tower directly above the shaft.

2.153 Tread — *See* Friction Tread.

2.154 Tubbing — A shaft lining consisting of a series of watertight segments of cast iron, steel or reinforced concrete.

2.155 Turn — *See* Wind.

2.156 Underlap Rope — The rope which commences coiling on a drum below the axis of the drum.

2.157 Upcast Shaft (UC) — A shaft through which air leaves a mine.

2.158 Walling Crib — *See* Curb.

2.159 Walling Scaffold Platform — The deck of the scaffold from which the walling operation is carried out.

2.160 Ward-Leonard Winder — *See* Winder Electric Drive.

2.161 Wedge-Type Capping — *See* Capping.

2.162 White Metal Capping — *See* Capping.

2.163 Wind — To raise or lower a conveyance in a shaft.

2.164 Winder — A winding Engine.

2.165 Winder Control System (Control System)

a) *Automatic* — The operation of a winder between predetermined level in the shaft without intervention by the winding engineman. Initiation of the wind can be either by push button from the appropriate loading or unloading points (semi-automatic) or by starting switches interlocked with and operated by the loading and unloading equipment (fully automatic).

b) *Closed Loop* — A system in which a reference signal corresponding to the desired output value is compared with the actual output value. Any deviation (error) between the two quantities is applied to the control system and automatically corrects the output value so that the error will tend to zero when the desired output is achieved.

c) *Cyclic* — A supervisory control system (q.v.) with closed loop control features by which a predetermined winding cycle can be maintained.

d) *Open Loop* — A system in which a control signal is given and the resultant output is determined by the inherent response of the system and not by any feedback from the output quantity. Deviations from the desired value may be corrected by adjustment of the control signal.

e) *Supervisory* — A system in which movement of the winding engineman's control lever from the neutral position always produces an increase of speed and return of the lever towards neutral always produces a reduction of speed, irrespective of the winder motor torque requirement. The winder motor speed does not necessarily correspond to the position of the control lever.

2.166 Winder Electric Drive

a) *A.C.* — A system using one or more three phase slip ring induction motors to drive the drum(s) through reduction gearing. Reversal is obtained by means of stator reversing contactors and speed control by external variable resistance in the rotor circuit.

b) *Converter Fed* — A system using one or more dc motors to drive the drum(s) directly or through reduction gearing, the armature(s) being connected to grid controlled mercury arc or thyristor converter equipment. Reversal of motor torque is obtained either by reversal of current flow through the armature(s) or by reversal of the winder motor field current. Speed control is obtained by variation in voltage developed by the mercury arc or thyristor equipment.

c) *Ward-Leonard* — A system using one or more dc motors to drive the drum(s) directly or through reduction gearing, the armature(s) being connected to one or more variable voltage dc generators forming part of a separate motor generators set. Reversal and speed control are obtained by variation of the polarity and magnitude of the voltage developed by the generator(s).

2.167 Winding Cycle — The total time for one complete wind in one direction in a shaft, including loading and unloading the conveyance(s) at the terminal point(s).

Indian Standard

MINING — GLOSSARY OF TERMS

PART 9 GEOLOGY

1 SCOPE

This standard (Part 9) covers the definition of terms used in mining industry in connection with geology.

2 TERMS AND DEFINITIONS

2.1 Agglomerate — A naturally cemented unstratified mass of coarse volcanic fragments.

2.2 Alluvial Deposit — Gravelly or sandy deposit formed by stream action.

2.3 Alluvium — Deposits, normally, unconsolidated, made by streams in channels and over their flood plains and deltas.

2.4 Alteration

a) Change in mineralogical composition of rocks.
b) Secondary changes in rocks and minerals.

2.5 Amorphous — Applicable to rocks and minerals having no definite crystalline structure.

2.6 Ankerite (Cleat Spar) — A white mineral, sometimes discoloured, commonly occurring in the cleat of coal. The main constituents are calcium, magnesium and iron carbonates.

2.7 Anthracite — Coal of the highest rank having volatile matter in the region of 10 percent or less.

2.8 Anticlinal Axis — The line along with the summit of an anticline from which the strata dip away in opposite directions.

2.9 Anticline — An arch-like upfold in stratified rocks.

2.10 Apparent Dip — The dip of a rock layer as exposed in any section not at right angles to the strike. It is always less than the true dip (*see* Fig. 1).

2.11 Aquifer — A permeable water bearing stratum, strata or part thereof.

2.12 Arenaceous — An adjective applied to rocks that have been derived from sand or that contain notable proportion of sand.

2.13 Argentiferous — An adjective applied to rocks which contain silver.

2.14 Argillaceous — An adjective applied to rocks composed of clay or having notable proportion of clay.

2.15 Ash — The incombustible residue after the incineration of any fuel substance.

2.16 Ash Content — The percentage of inorganic residue in a fuel determined in a laboratory under standard conditions.

2.17 Ash (Volcanic) — *See* Tuff.

2.18 Assay

a) To determine the metal content in an ore or mineral.
b) The result of such a determination.

2.19 Auxiliary Fault — A minor fault ending against a major fault.

2.20 Backs — The top or roof of an underground working.

2.21 Band — *See* Dirt Band.

2.22 Barren Ground — Unproductive strata in mines.

2.23 Basin — A structure in which the strata dip inwards on all sides.

2.24 Beach Placers — Deposits of mineral bearing sand concentrated by wave action.

2.25 Bed — A layer or rock or mineral.

2.26 Bedding Plane — The interface between two adjacent beds of sedimentary rock.

2.27 Bedrock — The solid rock underlying superficial deposits (*see also* Rockhead).

2.28 Bituminous Coal — A general term descriptive of coal other than anthracite and low-volatile coal on the one hand and lignite on the other.

2.29 Blind Vein (Blind Lode) — A vein or lode which does not reach the surface.

2.30 Block of Ore — A pillar or mass of ore sufficiently delineated.

2.31 Boulder Clay — Glacial clay, generally containing boulders or pebbles, also called 'till'.

2.32 Breccia — A rock consisting of broken angular, unworn fragments held together by a natural cement.

2.33 Buried Channel — An old channel filled and concealed by glacial or other superficial deposits.

2.34 Burnt Coal — Coal altered by heat either from an igneous intrusion within or near the seam or due to spontaneous heating or fire, etc (*see also* Jhama).

2.35 Caking Coal — Coal having the property of caking.

2.36 Cannel — *See* Cannel Coal.

2.37 Cannel Coal — A low ranking strong, non-banded coal with satin sheen or wax lustre showing a conchoidal fracture.

2.38 Carbonaceous — Consisting of or containing carbon or coal, especially of shale having particles of carbon distributed throughout the mass.

2.39 Chart — A compact siliceous rock formed of extremely fine and non-crystalline silica.

2.40 China Clay — *See* Kaolin.

2.41 Clay — A rock composed of colloidally fine complex silicates formed by the natural decomposition of igneous rocks.

2.42 Clay-Band Ironstone — Impure argillaceous carbonate of iron occurring in sandstones and shales, either as definite layers or as nodules.

2.43 Cleat — Joints in coal more or less normal to the bedding planes.

2.44 Cleat Spar — *See* Ankerite.

2.45 Cleavage — In a crystalline mineral or rock, the property to split along one or more sets of parallel planes.

In a rock, definite parallel closely spaced planes along which it may split, and which may be highly inclined to the bedding planes.

2.46 Coal — A black coloured combustible sedimentary rock (stratified) formed from variously altered plant remains.

2.47 Coal Balls — Calcareous concretions of mineralized plant debris occurring in certain coal seams.

2.48 Competent Beds — The beds or strata which because of inherent strength are able to lift not only their own weight but also of overlying rocks during folding.

2.49 Conglomerate — A rock consisting of rounded pebbles held together by a natural cement.

2.50 Connate Water (Fossil Water) — Inherent water contemporary with the rock containing it, as opposed to water subsequently permeating the rock.

2.51 Correlation — The determination of continuity or mutual relation of geological bodies in space and time.

2.52 Country Rock — A general term applied to the rock surrounding and penetrated by mineral body or an igneous intrusion.

2.53 Cover — The vertical distance between any position in the strata and the surface or any other position used as reference.

2.54 Crop — *See* Out Crop.

2.55 Cross Bedding (False Bedding) — Laminations, in a bed of sedimentary rock, which are inclined to the general stratification.

2.56 Cross Course — A vein or lode, which intersects the main productive veins or lodes (sometimes known as cross vein or cross lode).

2.57 Current Bedding — A particular form of cross bedding.

2.58 Dip — The inclination of strata to the horizontal (*see* Fig. 1) (*see also* 'Apparent Dip', and 'Full Dip').

2.59 Dip Fault — A fault whose strike is approximately at right angles to the strike of the bedding (or the vein).

2.60 Dirt Band (Band) — A layer of rock (for example shale or mudstone) in a coal seam.

2.61 Dolerite — Dark crystalline igneous rock of specific mineral composition and texture, forming instrusions, for example, dykes and sills.

2.62 Dolomite — A mineral composed of calcium magnesium carbonate or a rock consisting predominantly of that mineral.

2.63 Dome — A structure in which the strata dip inwards on all sides.

2.64 Downthrow — The amount, measured vertically, of downward displacement of beds caused by a fault.

2.65 Downthrow Side — The wall of a fault that has moved relatively downwards.

2.66 Drag — Minor folding of strata along the walls of fault in which the drag of displacement has produced flexures in the beds on either side.

2.67 Dyke — A tabular body of igneous rock that cuts across the structure of adjacent rock.

2.68 Evaporites — Rocks, such as anhydrite, rock salt, potash salts, formed by evaporation of lakes or seas.

2.69 False Bedding — *See* Cross Bedding.

2.70 Fault — A plane of fracture in a rock body along which there has been displacement. (*See* 'Dip Fault', 'Lag Fault', 'Normal Fault', 'Reversed Fault', 'Step Faulting', 'Strike Fault', 'Thrust Fault', 'Transcurrent Fault' and 'Trough Fault').

2.71 Fault Breccia — The shattered rock material along a fault plane.

2.72 Fault Drag — Distortion of the bedding which may occur in the vicinity of a fault plane.

2.73 Fault Plane — Any surface along which strata movement has taken place (*see* Fig. 2 to 4).

2.74 Fireclay — A seat earth commercially suitable for making refractories.

2.75 Float — Loose fragments of rocks, ore or gossan found at or near the surface or in stream bed.

2.76 Fold — A bend in bedded rocks.

2.77 Foliation — A general term indicating the planer structure in rocks resulting from segregation of different minerals into parallel layers or from minerals arranging themselves in more or less parallel layers.

Bedding plane is also called 'primary foliation'.

2.78 Footwall — The junction of the orebody and country rock on the lower side of the orebody.

2.79 Formation — A set of lithologically distinctive beds selected as a convenient unit for mapping and description.

2.80 Fossil Water — *See* Connate Water.

2.81 Fracture — A break in a rock mass.

2.82 Freestone — A uniform, fine-grained sandstone or limestone that can be easily sawn and shaped.

2.83 Full Dip (True Dip) — The maximum angle at which strata are inclined to the horizontal at the place of measurement (*see* Fig. 1 and Fig. 2).

2.84 Gneiss — A course grained igneous or metamorphic rock in which bands rich in granular minerals alternate with bands in which schistose minerals predominate.

2.85 Gossan — The oxidized equivalent of aggregated sulphide material usually consisting of ferric oxide and quartz or jasper, sometimes with manganese dioxide, clay mineral, etc.

2.86 Gouge — Finely abraded material, usually clay, associated with a fault.

2.87 Graben — *See* Trough Fault.

2.88 Green Schist — Schists of colour in shades of green formed by metamorphism of basic igneous rocks. The colouration is due mainly to chlorite minerals.

2.89 Greenstone — General term used to denote low grade metamorphic product of basic rocks, showing colour in different shades of green.

2.90 Ground Water — Water which has penetrated from the surface and filled the pores and fissures of the strata below the water table.

2.91 Hade — The angle of inclination of the plane of a fault to the vertical (*see* Fig. 2).

2.92 Hanging Wall — The junction of the orebody and the country rock on the upper side of orebody.

2.93 Heave — Amount of relative horizontal displacement caused by a fault at right angles to the strike of the fault plane (*see* Fig. 2 and Fig. 5).

2.94 Horse

a) A mass of barren rock within an orebody.
b) *See* Roll.

2.95 Horst — A block of strata that has been displaced upwards between two fault planes (*see* Fig. 6).

2.96 Hydrology — The science concerned with the occurrence, behaviour and nature of water on and within earth's crust.

2.97 Hydrothermal — Processes in which hot generally ascending, solutions originating from magma or other deep source in the earth are concerned.

2.98 Hypogen — Refers to the effects produced by ascending solutions in the earth's crust and generated from depth of earth.

2.99 Igneous Rock — A rock formed by solidification of molten matter that originated within the earth.

2.100 Incompetent Bed — A bed that is relatively weak in comparison with adjacent beds and which may crush or flow plastically under structural distortion (*see* Competent Bed).

2.101 Incrop — A former outcrop concealed by younger unconformable deposits.

2.102 Inlier — An area of older rocks surrounded by younger rocks (*see* also Outlier).

2.103 *In Situ* — Applies to rocks, soil and fossils that are situated in the place where they were originally formed.

2.104 Intrusion — A mass of igneous rock which, while molten, was forced into or between other rocks.

2.105 Ironstone — A rock containing a substantial proportion of an iron compound.

2.106 Isopachyte (Isopatch) — A line drawn on a map connecting all points at which a selected stratum, or a series of strata, has the same thickness.

2.107 Jasper — Finely granular to cryptocristalline quartzrock, usually coloured red from hematite inclusions.

2.108 Jhama — Coal altered by heat from an igneous intrusion within or near the seam (*see also* Burnt Coal).

2.109 Joint — A divisional plane or surface that divides a rock and along which there has been no visible movement parallel to the plane or the surface.

2.110 Kaolin (China Clay) — A white or nearly white clay resulting from the decomposition of felspar.

2.111 Lag Fault — A normal fault having a high angle of hade (*see* Fig. 4).

2.112 Lamination — A thin layer of bedding.

2.113 Laterite — Highly weathered iron rich residual portion of a rock resulting from the decomposition of iron and aluminium silicates under tropical climate and leaching out of silica. It has worm like voids and round grained structures.

2.114 Lensing — The thinning out of ore deposit (for example in alluvium) in one or more directions.

2.115 Lignite — Coal of low rank with a high inherent moisture and volatile matter; in this general sense, lignite may be sub-divided into black lignite, brown lignite and brown coal.

2.116 Limestone — Rock consisting predominantly of calcium carbonate.

2.117 Listric

a) Descriptive of rock surfaces that are polished, but not striated as in slickensides.

b) A particular form of thrust plane.

2.118 Lithology — The character of a rock expressed in terms of its mineral composition, structure, grain size and arrangement of its component parts.

2.119 Lode Channel — The track of the lode along which the orebody makes or develops again.

2.120 Lode (Lode Formation) — An appreciably mineralized body thin in relation to its other dimensions. Sometimes synonymous with vein or reef.

2.121 Log — The record of formation penetrated, drilling progress records of depth, drilling details etc in connection with drilling of a bore hole.

2.122 Marine Band (Marine Bed) — A bed which contains marine fossils.

2.123 Matrix — The finer grained material between the larger particles of a rock or the material surrounding a fossil or mineral.

2.124 Measures — A series of beds or strata; a term now generally limited to rocks within the 'coal measures'.

2.125 Metamorphic — Thorough change in texture or mineralogical composition of a rock, usually brought about by heat, pressure, or chemically active solution. Oxidisation and weathering processes are excluded.

2.126 Metamorphic Rock — Rock which has been altered by the action of heat, pressure, or migrating fluids, acting separately or together.

2.127 Mineral

a) A naturally occurring inorganic substance having definite chemical and physical properties.

b) A substance of economic value obtained by mining.

2.128 Mine Sample — A small quantity of coal or mineral bearing material taken from ore bodies and/or associated rock in a mine for analysis or laboratory tests for evaluation.

2.129 Monocline — A fold caused by change in the amount of dip, but having the same direction of dip over indefinite distance (*see* Fig. 7).

2.130 Mudstone — An indurated sedimentary rock consisting largely of clay minerals with little or no fissility.

2.131 Mussels — Loose term for fossil nonmarine shells (such as carbonicola, naiadites).

2.132 Nip Out — Local thinning or disappearance of a coal seam due to tectonic movement.

2.133 Normal Fault — A fault which hades towards the downthrow side (*see* Fig. 2).

2.134 Ore — A natural aggregate of one or more minerals from which one or more metals or minerals can be extracted with economic significance or for strategic reasons within the foreseeable future.

2.135 Orebody — A solid and fairly continuous mass of ore, which may include low grade and waste as well as pay ore.

2.136 Ore Dressing — The cleaning and upgrading of ore by the removal of certain valueless portions.

2.137 Ore Shoot — A part of a vein or lode usually richer than the adjacent areas.

2.138 Outcrop (Crop) — The part of a rock body, vein, coal seam, etc, that appears at the surface.

2.139 Outlier — A remnant of a younger rock surrounded by older rocks (*see also* Inlier).

2.140 Overburden — Material, whether consolidated or not, which has to be removed before a mineral can be worked.

2.141 Overbrust — *See* Thrust Fault.

2.142 Overlap — The extension of a bed beyond underlying conformable beds.

2.143 Palaeontology — The science that deals with the life of past geological ages, based on the study of fossil remains.

2.144 Parting

a) A plane, usually parallel to the bedding, at which a bed readily separates.
b) A very thin bed of rock in a coal seam.

2.145 Peat — A fairly compact substance, brownish to black in colour with palpable evidence of its origin by partial decomposition and disintegration of vegetable matter. It has very high moisture content.

2.146 Pegmatite — A body of igneous rock of exceptionally coarse grains, generally containing quartz, mica and feldspar.

2.147 Perched Water — Water lodged over an impervious stratum of restricted dimensions at a higher level than the water table.

2.148 Petrology — The study of the origin, chemical and mineral composition, structure, and alteration of rocks.

2.149 Pinch Out — *See* Nip Out.

2.150 Pitch — The angle which a directional feature (for example, slickensides) in a plane makes with a horizontal line within the plane (*see* Fig. 2).

2.151 Placer Deposit — Deposit of valuable in alluvial gravels.

2.152 Plunge — The inclination of the crest of an anticline or the trough of a syncline.

2.153 Pudding Stone — *See* Conglomerate.

2.154 Pyrite — Iron sulphide; a hard yellow mineral found in some coal seams, mudstone, etc.

2.155 Quartz — A visibly crystalline mineral composed of silica.

2.156 Quartzite — A granulose metamorphic rock consisting essentially of quartz, and also sandstone cemented by silica which has grown in optical continuity around each fragment.

2.157 Rank — The position of a coal relative to other coals in the coalification series from brown coal (low rank) to anthracite (high rank) indicating its maturity in terms of its general chemical and physical properties.

2.158 Rashings

a) Carbonaceous shale with coal streaks.
b) Soft shale, normally carbonaceous; often associated with coal seams and containing sheared coal fragments.

2.159 Reversed Fault — A fault which hades towards the upthrow side.

2.160 Rider — A thin seam overlying a thicker seam.

2.161 Rock

a) Any naturally formed aggregate or mass of mineral matter whether or not coherent, constituting an essential and appreciable part of the earth's crust, and
b) In mining, the term is restricted to consolidated deposits, especially when hard, for example, sandstone.

2.162 Roll (Horse) — A local thickening of roof or floor strata, causing thinning of a coal seam.

2.163 Sample — A representative part of an ore body (or coal) which should truly represent the average value of a larger portion of the ore deposit.

2.164 Sampling — The process of drawing a sample.

2.165 Sandstone — A bedded rock composed of grains of sand, principally of quartz, cemented naturally together.

2.166 Schistosity — The characteristics of a rock having dimensional parallelism of constituent minerals.

2.167 Seam — A stratified deposit, usually of coal.

2.168 Seatclay — *See* Seatearth.

2.169 Seatearth — A bed representing old soil, usually containing abundant rootlets, underlying a coal seam (*see also* Fireclay).

2.170 Sedimentary Rock — Rock formed by accumulation of sediment or material in water or from air.

2.171 Shale — A compacted clayed sedimentary rock often laminated.

2.172 Shearing — The deformation of rocks by the cumulation of small lateral movements along innumerable parallel or sub-parallel planes.

2.173 Shell Bed — A bed containing abundant fossil shells.

2.174 Silification — The introduction of or replacement by silica.

2.175 Sill — An intrusive sheet of igneous rock parallel or nearly parallel to the general stratification.

2.176 Silt — A fine-grained sediment having a particle size intermediate between that of fine sand and clay.

2.177 Siltstone — A consolidated silt.

2.178 Slate — A fine grained metamorphic rock, possessing well developed fissility.

2.179 Slickenside — A polished and scratched surface resulting from friction along fault plane.

2.180 Slip — The relative displacement of formerly adjacent points on opposite sides of a fault measured in the fault surface.

2.181 Slump Bedding (Slurry Bedding) — Disturbed strata interbedded between undisturbed strata, caused by flow of newly deposited sediment.

2.182 Smut — A thin band of soft inferior coal.

2.183 Splint or Splent Coal — Hard coal with a dull luster and uneven fracture.

2.184 Splitting — Branching out of a thicker coal seam or ore body.

2.185 Step Faulting — The progressive displacement of the strata between faults which hade and throw in the same direction.

2.186 Stockwork — A mass of rock irregularly fractured along which mineralisation has spread.

2.187 Stratification — A structure produced by deposition of sediments in beds or layers, laminae, lenses, etc.

2.188 Stratum (Pl. Strata) — A single bed or layer of rock.

2.189 Streak — The colour of the powder of a mineral as obtained by scratching the surface of the mineral.

2.190 Strike — The direction of horizontal line in the plane of an inclined stratum, joint, or other structural plane (*see* Fig. 1 and Fig. 2).

2.191 Strike Fault — A fault whose strike is parallel to the stroke data.

2.192 Stringer — A narrow vein or irregular filament of mineral traversing a rock mass of different material.

2.193 Structure Contours (Stratum Contours) — An imaginary line of equal elevation on a selected surface, generally of stratigraphic horizon, structural surface, wall of ore bodies, etc.

2.194 Superficial Deposits (Surface Deposits) — The most recent deposits, generally unconsolidated (for example, moss, peat, sand, gravel, silt, mud, material disturbed by opencast works, etc.) lying above the rock head.

2.195 Supergene — Generated from above; refers to effects produced by groundwater.

2.196 Syncline — A trough-like down fold in stratified rocks.

2.197 Tabular Deposit — A flat table like deposit.

2.198 Tear Fault — *See* Transcurrent Fault.

2.199 Tectonic — Pertaining to or resulting from the physical forces which have been or still are operative in the earth's crust.

2.200 Tension Fracture — A fracture that is the result of stress that tend to pull materials apart.

2.201 Throw — Vertical displacement in a fault measured in a vertical plane perpendicular to the strike of the fault (*see* Fig. 2).

2.202 Thrust Fault (Overthrust) — A reversed fault with low inclination to a horizontal plane, or hading at a high angle (*see* Fig. 5).

2.203 Transcurrent Fault (Tear Fault, Transverse Fault and Wrench Fault) — A fault resulting from movement that is essentially horizontal along the face of the fault, the plane of fracture being vertical or approximately so.

2.204 Trough — Line occupying the lowest part of a fold.

2.205 Trough Fault (Graben) — A block of strata that has been displaced downwards between two fault planes (*see* Fig. 3).

2.206 True Dip — *See* Full Dip.

2.207 Tuff Ash (Volcanic) — A fine grained unconsolidated or semi-consolidated volcanic ash.

2.208 Unconformity — A substantial break in the continuity of deposition, where one rock formation is overlain by another that is not the next in geological succession.

2.209 Unconsolidated Strata — Rock consisting of loosely coherent or uncemented particles, whether occurring at the surface or at depth.

2.210 Underthrust — A low angle reverse fault resulting from the sliding of the footwall beneath a relatively passive hanging wall.

2.211 Upthrow — The amount, measured vertically, of upward displacement of beds caused by a fault.

2.212 Upthrow Side — The higher side of a fault after displacement has occurred.

2.213 Vein

a) A mineral body, thin in relation to its other dimensions, which cuts across the bedding and in which the minerals are later than the country rock.

b) A term sometimes used for a bed; for example, a coal seam or a bed of slate.

2.214 Wall Rock — The country rock immediately adjacent to a vein or lode.

2.215 Want — An area in which a bed, usually a coal seam, is missing due to the presence of a normal or a lag fault (*see* Fig. 2).

2.216 Washout

a) Local thinning or disappearance of a coal seam due to erosion during or shortly after its formation.

b) Local thinning or disappearance of a coal seam due to tectonic movement (*see also* Nip Out).

2.217 Width of Lode — The thickness of ore measured at right angles to the dip of the lode or vein.

2.218 Wrench Fault — *See* Transcurrent Fault.

2.219 Zone

a) A group of beds, characterized by the presence of one or more specific fossils, for example, the zonal fossil or fossils.

b) Interval bounded by two surfaces (tangible or imaginary) between which given physical or chemical conditions exist.

2.220 Zoning — In a mineral deposit the occurrences of successive mineral or elements outward from a common center.

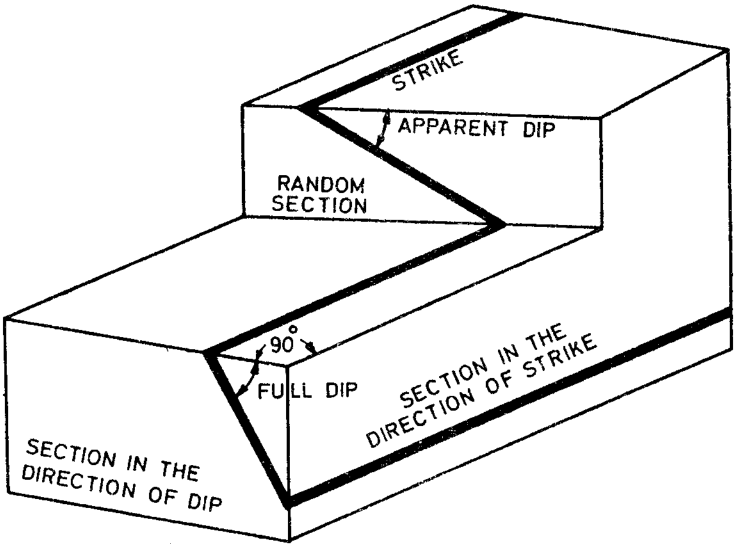

STRIKE
APPARENT DIP
RANDOM SECTION
90°
FULL DIP
SECTION IN THE DIRECTION OF STRIKE
SECTION IN THE DIRECTION OF DIP

FIG. 1 DIP AND ASSOCIATED TERMS

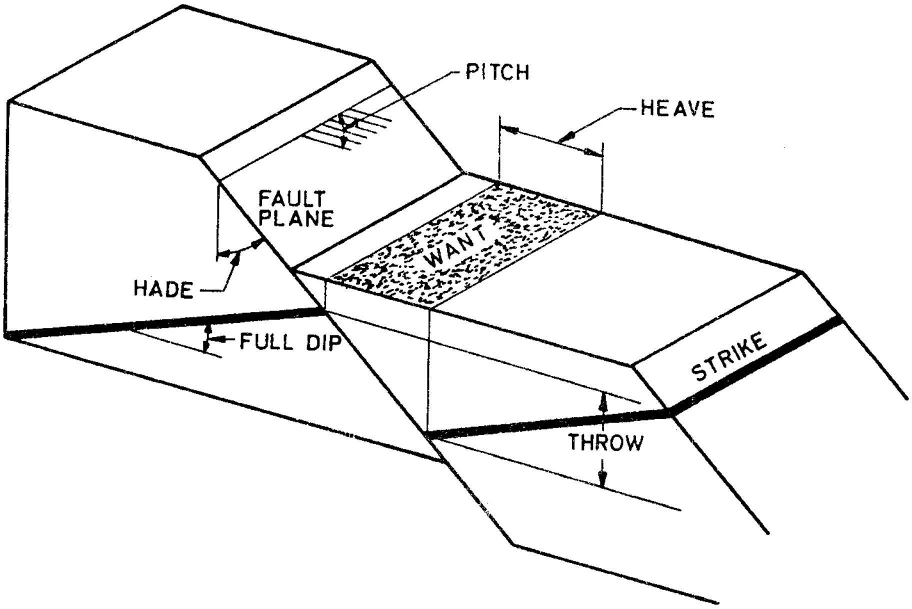


FIG. 2 NORMAL FAULT AND ASSOCIATED TERMS

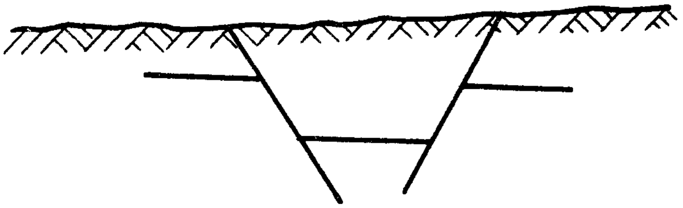


FIG. 3 TROUGH FAULT (IN SECTION)

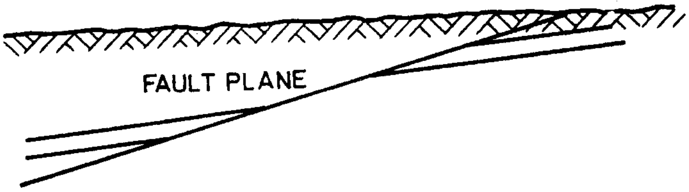


FIG. 4 LAG FAULT (IN SECTION)

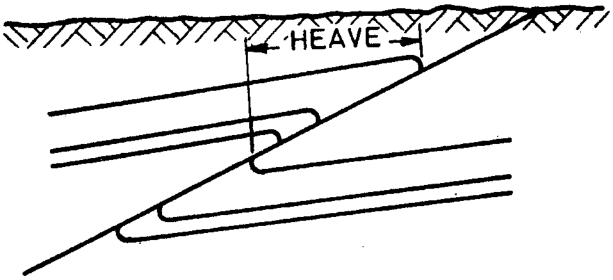


FIG. 5 THRUST FAULT OR OVERTHRUST (IN SECTION)

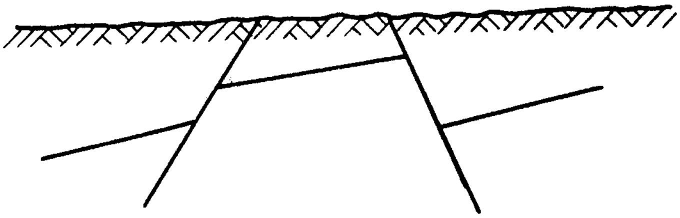


FIG. 6 HORST (IN SECTION)

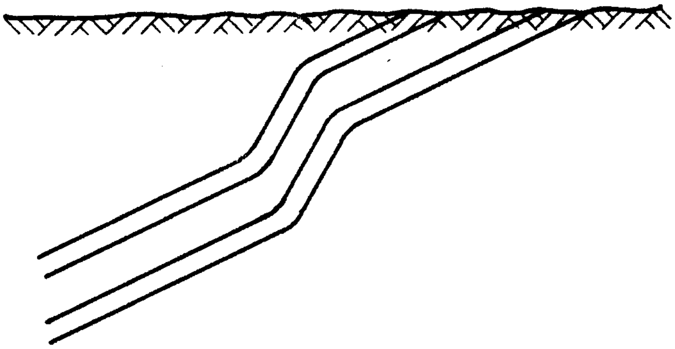


FIG. 7 MONOCLINE

Indian Standard

MINING — GLOSSARY OF TERMS

PART 10 TRANSPORT

1 SCOPE

This standard (Part 10) covers the terms relating to transport used in the field of mining.

2 TERMS AND DEFINITIONS

2.1 Angle Station — An arrangement in a conveyor or aerial ropeway installation at points where the conveyor or ropeway takes a turn in horizontal or vertical direction.

2.2 Apron Feeder (Plate Belt Feeder) — A short conveyor of belt or plate type connecting two conveying systems or one conveying system and bunker

2.3 Armoured Flexible Conveyor (AFC) (Heavy Armoured Conveyor, Panzer Conveyor) — A chain conveyor having round steel link chain(s) with guided top and bottom chains, on which a coal cutter or a power loader can be carried and is capable of being continually snaked forward, section by section, as the face advances on a prop-free front longwall face

2.4 Automatic Doors — Doors which are actuated to open and close automatically by the approach or position of a conveyance or vehicle.

2.5 Axle Counter — A mechanical counting device arranged to initiate a series of operations after the passage of a predetermined number of vehicles.

2.6 Back Balance — *See* Guide Rail.

2.7 Back Shunt (Kick Back) — A device in a rail system whereby the direction of vehicles is reversed, either by the reverse gradient or by mechanical action.

2.8 Back Stay (Bar Hooks, Drag) — A safety appliance attached to the back of the last tub/car of a set of tubs/cars and dragging between the rails; when hauled up an inclined plane, it will throw the tubs/cars off the rails in the event of runaway.

2.9 Balance Bogie (Balance Car) — *See* Tension Bogie (Balance Bogie, Balance Car).

2.10 Bankhead (Landing) — The top of an inclined tracked haulage road where the gradient levels off thereby facilitating the handling of vehicles.

2.11 Bar Hook — *See* Back Stay (Bar Hooks, Drag).

2.12 Belt Conveyor — An endless fabric, rubber, plastic, leather or metal belt operating over suitable drive, tail end and bend terminals and over belt idlers or slider bed for handling bulk materials, packages, or objects placed directly upon it.

2.13 Belt Fastener — A mechanical device for making belt joints.

2.14 Belt Weigher (Weightometer, Conveyor Scale) — An appliance for continuous weighing of material in transit on a belt conveyor.

2.15 Bogie — A small four-wheeled trolley.

2.16 Bottom Belt Conveyor — A belt conveyor which carries its load on the bottom strand.

2.17 Bridge Conveyor

a) A short conveyor used to transfer mineral from the delivery jib of a loading machine to a conveyor or vehicle.

b) A conveyor connecting conveyors at different levels.

2.18 Bunker Conveyor — A long hopper having an integral conveyor(s) which is used to store the mineral and control its discharge.

2.19 By Pass

a) A siding in an underground haulage track having a turnout at both ends to the main line.

b) A small driveway half-way round a shaft at the pit bottom or at the mid-landing and used for going from one side of the shaft to the other side without crossing through the shaft.

2.20 Cable Belt Conveyor — A belt in which the carrying section is composed of rubber and/or other polymer and fabric with specially shaped moulded rubber/polymer edges. The edges rest on and are supported by metal cables which transmit the driving force, the belt merely functioning, as a load supporting medium.

2.21 California Crossing — An arrangement of plates and ramps which is superimposed on a double track of rails, and which can be slid along them, to provide a cross-over, enabling rail vehicles to be transferred from one track to the other without lifting.

2.22 Cap — To attach a terminal unit to the end of a rope

2.23 Cappel — A rope-end attachment, excluding thimbles, of various types used for effectively connecting a hoist rope to, a shaft conveyance, a haulage rope to a set of tubs/cars, guide and rubbing rope to a tension weight, a balance rope to the bottom of the shaft conveyance and for anchoring purposes of other mining ropes.

2.24 Capping — The complete attachment fitted at the end of a rope, by means of which the rope is coupled to any apparatus. Various types of capping are given in **2.24.1** and **2.24.2**.

2.24.1 *White Metal Type*

A capping in which the rope is secured in white metal in tapered socket (*see* Fig. 1).

2.24.2 *Zinc Cone and Tail Strand Type*

An inserted cone capping in which a rifled zinc cone, cast on a loose strand, is inserted in the centre of the rope in place — of a length of core. (Commonly used on rope haulage systems underground) (*see* Fig. 2)

2.25 Car — *See* Mine Car (Car).

2.26 Car Pusher — A pneumatic, hydraulic or electric power operated car pushing device.

2.27 Car Stop (Tub Stop) — A mechanical device for arresting a mine tub or mine car and holding it in a predetermined position.

2.28 Centre Throw — The distance by which the midpoint of the wheelbase of a rail vehicle, on the vertical centreline, moves horizontally towards one side of the centerline of the track when the latter is curved.

2.29 Chain Conveyor — A conveyor having one or more chains equipped with scraper bars and operating in a trough.

2.30 Check Rail (Check Plate, Guide Rail) — A rail or plate to provide additional guidance for vehicles on rail track at curves and crossings and to prevent derailments.

2.31 Checkweighman — A man who checks the weight of coal in mine tubs or mine cars on behalf of the miners.

2.32 Clearance

a) The adequacy of transport for mineral between face and surface.

c) The clear space between any part of vehicles or conveyors and the sides or roof of the roadway, and between vehicles on adjacent tracks and/or conveyors.

2.33 Clifton Wheel — *See* Surge Weel (Clifton Wheel).

2.34 Clip — A clamping device by which a tub or a train of tubs is attached to an endless haulage rope.

2.35 Clip On (Hang On) — To attach a tub or tubs to a haulage rope by a clip or shackle.

2.36 Combined Drive — *See* Multiple Drive Conveyor (Combined Drive).

2.37 Conditioner Box — A chamber containing baffles, liquid and sometimes chemicals, to reduce the harmful effect of exhaust gases from a diesel engine in a mine.

2.38 Connector Pan (Ramp Pan) — A specially shaped inclined pan used to connect the line pan structure of an armoured flexible conveyor to its drivehead.

2.39 Coupling (Coupler) — An attachment by which vehicles are linked to each other or to locomotives, or to a haulage rope.

2.40 Creeper (Feeder) — A slowly moving endless chain with provision for engaging the axles or dummy axles of tubs or cars to move them.

2.41 Crossing — An arrangement of rails by which one track crosses another.

2.42 Crossing Vee (Frog) — A fabricated or cast unit of rails forming the vee in a crossing.

2.43 Cross-Over Bridge — A structure used by pedestrians for crossing the conveyor.

2.44 Deckplate — That portion of an armoured flexible conveyor along which mineral is moved.

2.45 Decking Ram — A pneumatic, hydraulic or electric power operated shaft decking equipment used for the purpose of loading or unloading of a cage.

2.46 Delivery End (Head End) — The end of a conveyor from which the material is discharged.

2.47 Direct Rope Haulage (Main Rope Haulage)

a) A single rope haulage system in which the free end of the rope is attached to set of mine tubs/cars to be hauled up or lowered down an inclined plane with an inclination greater than 5° (*see* Fig. 3).

b) Double-drum double-rope system in which the free end of each rope is attached to set of tubs/cars which are hauled up in opposite directions on parallel tracks on a haulage plane.

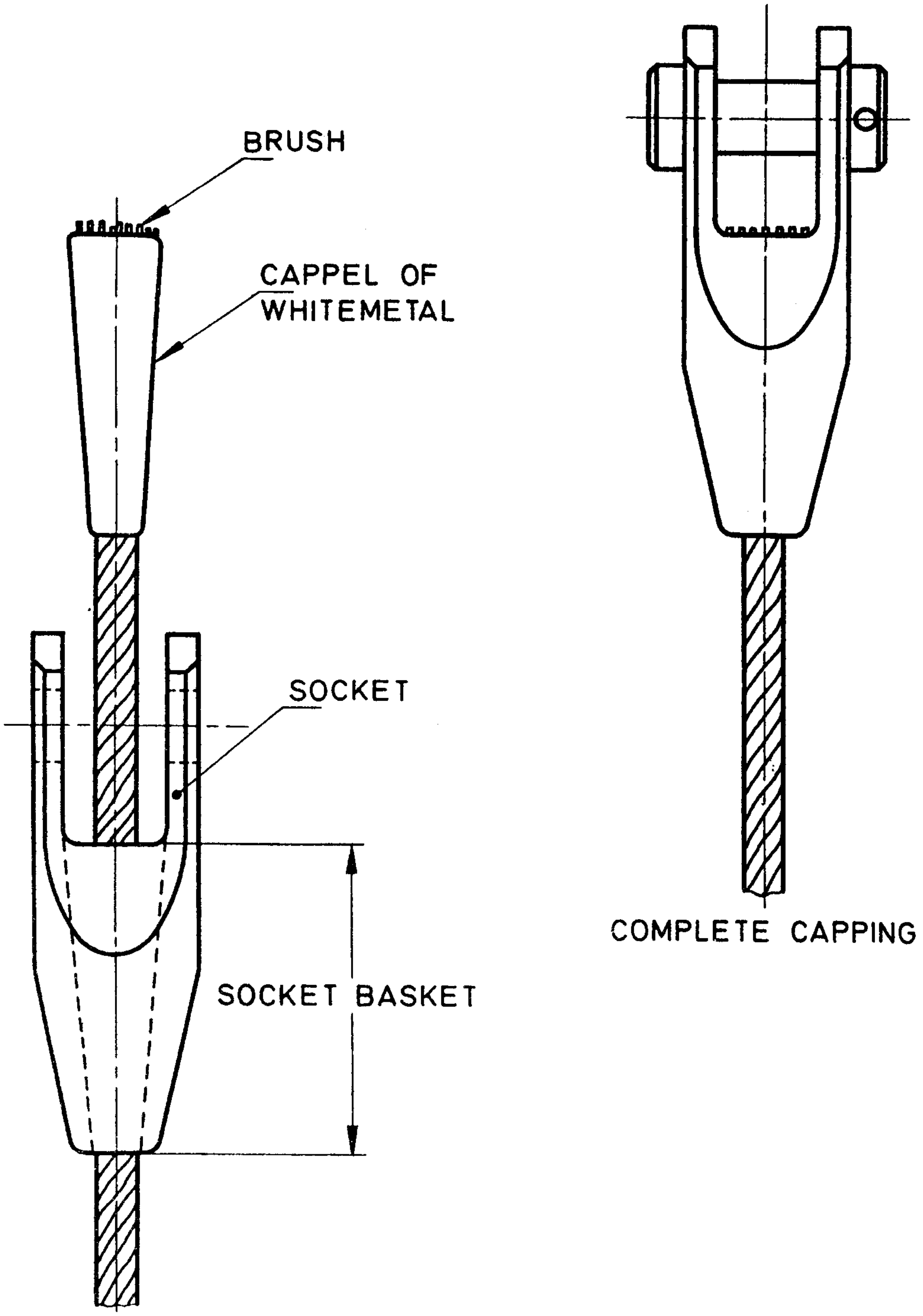


FIG. 1 WHITE METAL TYPE ROPE CAPPING

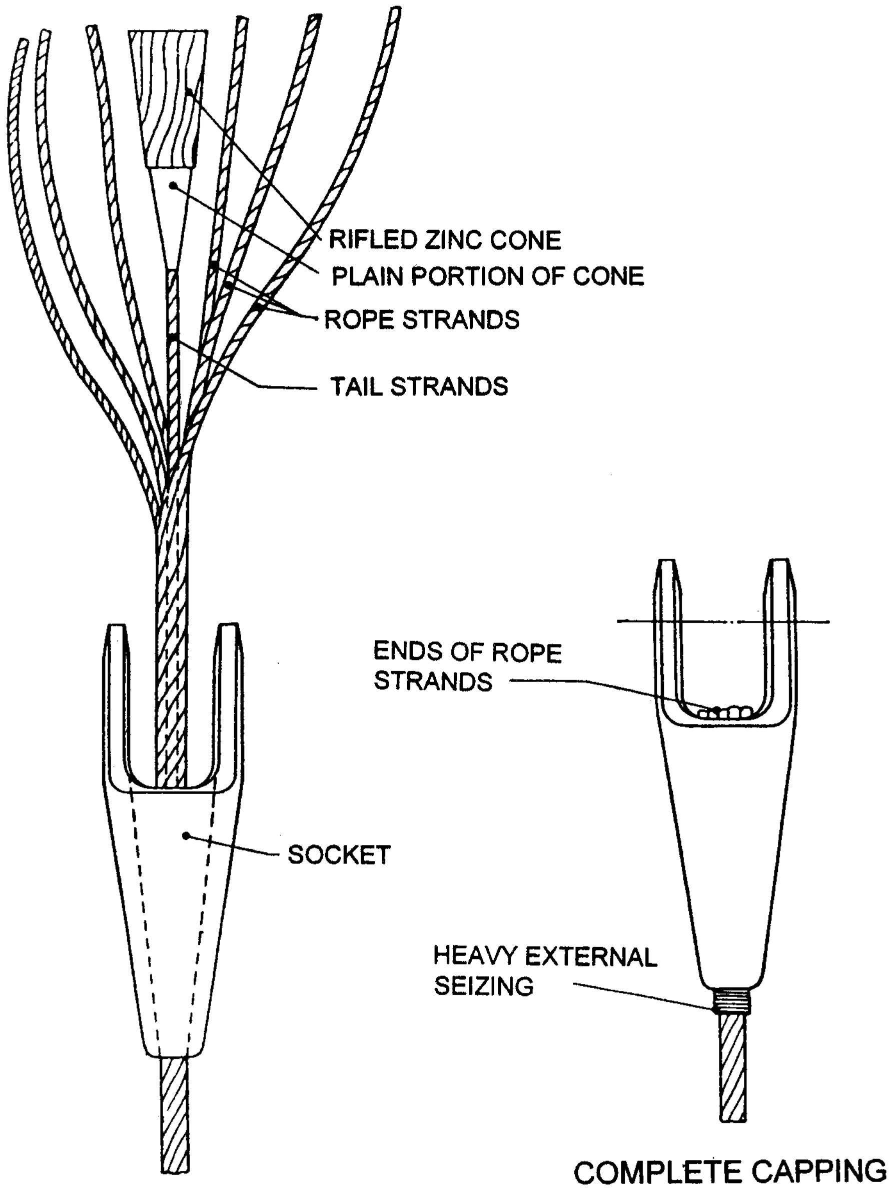


Fig. 2 Zinc Cone and Tail Strand Type Rope Capping

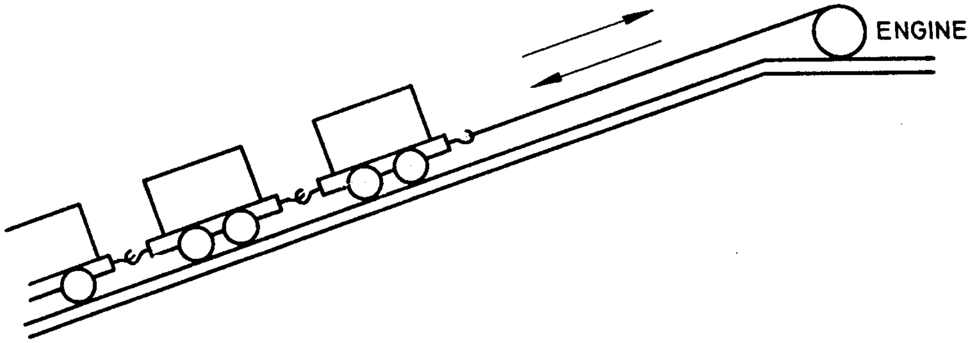


Fig. 3 Direct Rope Haulage

2.48 Drag — *See* Back Stay (Bar Hooks, Drag).

2.49 Drawbar — The structural component of a tub which transmits the hauling force.

2.50 Drawbar Pull (of a Locomotive) — The calculated force of the locomotive available at the drawbar for hauling the trailing load. It is equivalent to tractive effort less the resistance to be overcome by the locomotive itself.

2.51 Drive Head/Drive Unit — This term applies to the drive unit of a conveyor which may be located either at the head-end (main drive unit or head-end drive) or at the tail-end (tail-end drive or auxiliary drive) or at both-ends.

2.52 Driving Pulley — A powered pulley which drives a belt.

2.53 Dummy Axle — A rigidly mounted false axle or bar on a mine car to provide a contact point with car stops, rams and creepers.

2.54 Endless Rope/Chain Haulage — A double track rope or chain haulage system in which an endless moving rope or chain draws full and empty cars in opposite directions simultaneously. The cars are attached singly or in a set at regular intervals (*see* Fig. 4).

2.55 End Throw — The distance by which a point at the end of a rail vehicle, on the vehicle centreline, moves horizontally towards one side of the centreline of the track when the latter is curved.

2.56 Extensible Belt Conveyor — A belt conveyor which can be extended in length while in motion and carrying load.

2.57 Face Conveyor — A conveyor used to transport mineral along a working face (*see also* Underground Mine Conveyor).

2.58 Feeder — *See* Creeper (Feeder).

2.59 Feeder Conveyor — An auxiliary conveyor used to transport and regulate the flow of mineral between two points in a transport system.

2.60 Flame Trap — A device fitted to the inlet and exhaust systems of diesel engines to prevent the emission of flames or sparks.

2.61 Flight — *See* Scraper Bar (Flight).

2.62 Friction Haulage — A rope haulage in which the rope is driven by friction on a narrow drum (surge wheel) or grooved wheels.

2.63 Frog — *See* Crossing Vee (Frog).

2.64 Gathering Conveyor — *See* Underground Mine Conveyor.

2.65 Gauge — The distance between edges of rails of a track.

2.66 Gravity Haulage — *See* Self-Acting Incline, (Gravity Haulage).

2.67 Gravity Take-Up — A means of applying tension to take up the slackness of a conveyor belt or endless rope haulage system, by a suspended weight.

2.68 Guide Rail — *See* Check Rail (Check Plate, Guide Rail).

2.69 Hammock Idler — A type of flexible belt-carrying idler with ends supported in pivoted stands. The tube sags under the weight of the load to form a trough.

2.70 Hang On — *See* Clip On (Hang On).

2.71 Haulage Engine — A mechanical device to raise or lower tubs by means of rope.

2.72 Haulage Road — An underground roadway used primarily for the transport of mineral or supplies by vehicle.

2.73 Haulage (Rope) — *See* 'Endless Rope/Chain Haulage', 'Friction Haulage', 'Main and Tail Rope Haulage', 'Over-Rope Endless Haulage', and 'Under-Rope Endless Haulage'.

2.74 Head End — *See* Delivery End (Head End).

2.75 Heavy Armoured Conveyor — *See* Armoured

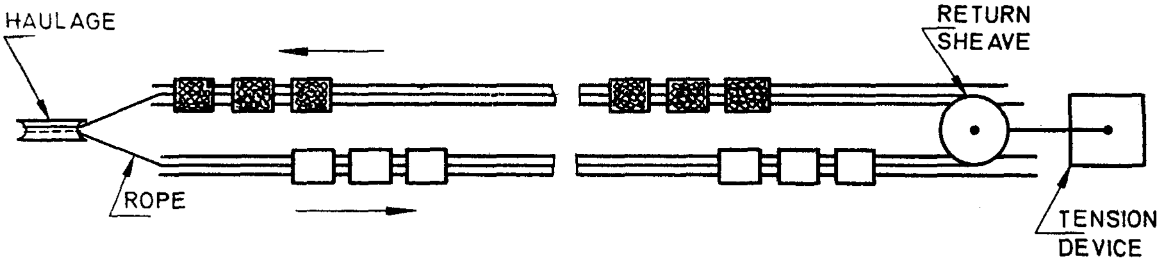


FIG. 4 ENDLESS ROPE HAULAGE

Flexible Conveyor (AFC) (Heavy Armoured Conveyor, Panzer Conveyor).

2.76 Idler — Free running rollers used to support, trough or align a conveyor belt.

2.77 Intermediate Haulage Conveyor — *See* Underground Mine Conveyor.

2.78 Intermediate Loading Section — A specially constructed section of trunk conveyor structure sited at an intermediate transfer point.

2.79 Jazz Rail (Swan Neck Rail) — A short abruptly curved section of track designed to derail runaway tubs

2.80 Journey (Trip) — Travel of a train or a set of cars from one point to another along a haulage roadway.

2.81 Kick Back — *See* Terms and Definitions.

2.82 Knocking Off — Detaching a tub from a haulage rope

2.83 Landing — A part of an inclined tracked haulage road where the gradient has been reduced to facilitate the handling of vehicles; usually at the top and bottom of the haulage road (*see* Bankhead (Landing).

2.84 Lash On — To attach tubs to an endless rope by means of a lashing chain.

2.85 Lashing Chain — A short length of chain with a hook at each end used to attach tubs to an endless haulage rope.

2.86 Lay By — A siding in an underground haulage track having a turnout at one end only.

2.87 Line Pan (Pan) — A unit of chain conveyor structure.

2.88 Loading Point (Loading Station) — A point at which mineral or stowing material is transferred from a bunker or a transport system (conveyor, chute, shuttle car, scraper haulage, etc) to another transport system (conveyor, mine cars skip, etc).

2.89 Loop Take-Up — Part of a conveyor structure used to accommodate spare belting and so facilitate extension of the conveyor. This usually includes tensioning arrangements.

2.90 Main and Tail Rope Haulage — A single track rope haulage system, used in level or undulating roadways, in which a train of full tubs is hauled by a rope attached to the front of the train (main rope) and is prevented from over-running by a further rope attached to the rear of the train (tail rope). On the return run the tail rope hauls the empty train. The ropes have separate haulage drums, independently clutched and carried on a common driving shaft. At any time, one drum is engaged, the other being controlled by a brake (*see* Fig. 5).

2.91 Main Haulage Conveyor — *See* Underground Mine Conveyor.

2.92 Main Rope Haulage — *See* Direct Rope Haulage (Main Rope Haulage).

2.93 Mangle Roller Drive (Snub Pulley) — A spring mounted guide roller which presses the belt tightly against the driving drum of a belt conveyor.

2.94 Manhole — *See* Refuse Hole (Manhole).

2.95 Manrider — A manriding train.

2.96 Manriding Car — A rail mounted car designed to transport men.

2.97 Measuring Pocket — A bunker or other receptacle located near a shaft, and of the required capacity for charging a skip.

2.98 Mine Car (Car) — A receptacle mounted on rail wheel of capacity greater than 1.3 m^3 used primarily to transport material employing wheels incorporating precision bearings.

2.99 Mine Tub (Tub) — A receptacle mounted on rail wheels of capacity up to 1.3 m^3 used primarily to transport material.

2.100 Monkey — A pivoted axle catch situated on a haulage track to prevent tubs running back.

2.101 Monorail — An apparatus for carrying men or materials underground, usually by suspending them from one or more bogies which travel along a single rail slung from the roof.

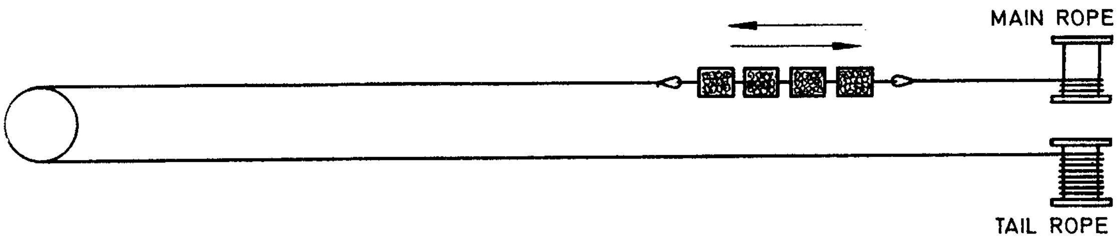


FIG. 5 MAIN AND TAIL ROPE HAULAGE

2.102 Multiple Drive Conveyor (Combined Drive) — A heavy duty conveyor having more than one driving unit, a common arrangement being to position one or more driving units at each end. With certain conveyors, additional drives may be interposed between the terminal drives.

2.103 Multiple Drum Conveyor Drive — A belt conveyor driving unit in which the belting is in contact with more than one power driven drum.

2.104 Over-Rope Endless Haulage — A form of endless rope haulage where the running rope is suspended over the cars by pulleys fixed to the roof (*see* Haulage Rope and Fig. 6)

2.105 Panzer Conveyor — *See* Armoured Flexible Cobnveyor (AFC), Heavy Armoured Conveyor, and Panzer Conveyor).

2.106 Plate Belt Feeder — *See* Apron Feeder (Plate Belt Feeder).

2.107 Plate Conveyor — A conveyor composed of flat or shaped plates, carried on chains and running on tracks.

2.108 Plough — A deflector to unload materials from a flat belt conveyor at any point along its length.

2.109 Point — *See* Switch (Points).

2.110 Pulley — A sheave or wheel with a grooved rim for supporting or guiding a haulage rope.

2.111 Ramp Pan — *See* Connector Pan (Ramp Pan).

2.112 Ramp Plate — Inclined plates attached to the face side of the line pans of an armoured flexible conveyor, to clear a path for the conveyor to be rammed forward.

2.113 Refuge Hole (Manhole) — An excavation in the side of a roadway in which persons can take shelter while vehicles are passing.

2.114 Remote Delivery End — An extension of the structure between the driving unit and the discharge point of a conveyor.

2.115 Re-railer — A fixed or portable device for restoring a derailed vehicle to the track while in motion.

2.116 Retarder — A device operating on the wheels, axles or dummy axles, or sides of a tub or mine car for slowing its speed

2.117 Retarding Conveyor — Any type of conveyor used to retard the rate of movement of bulk materials, packages or objects where the slope is such that conveyed material tends to propel the conveying medium.

2.118 Return Wheel — A terminal sheave which reverses the direction of the rope in a haulage system.

2.119 Room Conveyor — *See* Underground Mine Conveyor.

2.120 Rope-Belt Conveyor — A belt conveyor in which the idlers are supported from stationary wire ropes mounted along the length of the conveyor (*see* Cable Belt Conveyor).

2.121 Runaway Switch — A track switch by means of which runaway cars can be derailed.

2.122 Safety Chain — A chain connecting the cars in a train to prevent separation in the event of a coupling failure.

2.123 Scotch Block — A wedge-shaped block placed in front of a wheel to brake a vehicle.

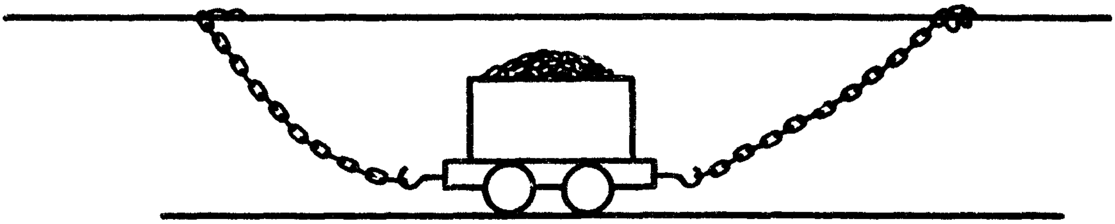


FIG. 6 OVER-ROPE ENDLESS HAULAGE

2.124 Scraper Bar (Flight) — A cross member fitted at regular intervals to the chain(s) or between chains of a chain conveyor to move the material.

2.125 Scraper Chain Conveyor — It is a conveyor in which the material is carried by an endless chain and flight combination in stationary pans.

2.126 Self-Acting Incline (Gravity Haulage) — A system of rope haulage in which full mine tub/car or a set of mine tubs/cars running down an inclined plane hauls up, an empty tub/car or a set of empty tubs/cars the rope passing round a sheave at the top of the incline. The speed of the haulage is controlled by mechanical or electrical braking.

2.127 Set — *See* Train (Set).

2.128 Sheave — A rope pulley of large diameter.

2.129 Shuttle Car — A large capacity tyre-mounted power-driven vehicle used with a mechanical loader in trackless mining to transport load from the face to a discharge point. A chain conveyor with an independent drive is incorporated at the bottom of the vehicle to facilitate loading and unloading.

2.130 Ski-Lift — A form of transport on which men are carried in underground roadways on seats suspended from rope and propelled either by the same rope or by a second rope.

2.131 Snub Pulley — *See* Mangle Roller Drive (Snub Pulley).

2.132 Spill Plates — Plates attached to conveyor pans to prevent spillage and to increase the capacity of conveyor.

2.133 Spiral Chute — A helical chute for the controlled lowering of material by gravity into a bunker or for lowering material or dirt from one level to another, when installed in a shaft.

2.134 Sprag — A wooden or iron bar placed between the spokes of a tub or mine car wheel to prevent rotation.

2.135 Squeezer — *See* Retarder.

2.136 Stage Loader — A feeder conveyor with round link chains used primarily between the face and gate conveyors.

2.137 Stop Block — A safety block, usually of hardwood, placed across or between the track at the top of a haulage incline to stop accidental running down of cars.

2.138 Strap Lift — An overhead moving rope with a grip attachment, to assist men in walking along steeply inclined roadways.

2.139 Surge Weel (Clifton Wheel) — The driving wheel of an endless rope haulage having appropriate groove(s) or grooves profile which transmits the tractive force by the frictional force between the groove(s) and the rope.

2.140 Swan Neck Rail — *See* Jazz Rail (Swan Neck Rail).

2.141 Swing — The extreme horizontal movement of a vehicle on a straight track produced by the cumulative effects of clearances between wheel flanges and rails, play in axle bores, etc.

2.142 Switch (Points) — That part of a turnout, comprising a pair of tapered movable rails and their linkage, which diverts a vehicle from one track to another.

2.143 Tail End (Tension End) — The unit incorporating the return pulley or shaft sprocket at the end of a conveyor remote from the delivery end.

2.144 Tail Rope — *See* Main and Tail Rope Haulage.

2.145 Take-Up — A tensioning arrangement necessary for belt conveyors to provide and maintain sufficient belt tension at all times to prevent slippage at the driving pulley(s), to take up slack belt and sometimes to serve as a means of storing a small amount of extra belt.

2.146 Tally — A tag attached to a full car giving the indentity of the person(s) responsible for filling it.

2.147 Tension Bogie (Balance Bogie, Balance Car) — A trackmounted frame connected to a balance weight employed to maintain slackside tension in an endless rope haulage system.

2.148 Tension End — *See* Tail End (Tension End).

2.149 Thimble — Grooved metal fitting to protect the eye of a wire rope.

2.150 Tippler — A mechanical arrangement for tipping wagons, mine cars or tubs.

2.151 Top Belt Conveyor — A belt conveyor system in which mineral is carried on the upper strand.

2.152 Track Roller — A freely rotating drum having a straight profile parallel or tapering between flanges, used to support or guide a moving rope (*see* Idler).

2.153 Tractive Effort — The force available at the treads of the wheels of a locomotive or tractor to move itself and the train of cars.

2.154 Train (Set) — A number of tubs or cars coupled together.

2.155 Trammer — One who pushes cars along the track.

2.156 **Tramming** — To haul or push tubs manually.

2.157 **Transfer Point** — A place at which mineral is transferred from conveyor to another.

2.158 **Traverser** — A short length of rail track mounted on a low wheeled carriage so that it may be moved sideways to transfer vehicles from one track to another.

2.159 **Trestle** — A steel tower carrying sheaves over which aerial ropeway is supported.

2.160 **Trip** — *See* Journey (Trip).

2.161 **Tripper** — A structure containing two drums introduced into the run of a belt conveyor either to hold the belt at a change of gradient or to facilitate discharge at an intermediate point which can be varied.

2.162 **Trolley** — A low rail-mounted carriage.

2.163 **Trolley Wire Locomotive** — An electric locomotive taking power from an overhead conductor by means of current collector.

2.164 **Troughed Belt Conveyor** — A belt conveyor with the conveyor belt edges elevated on the carrying run to form a trough by conforming to the shape of the troughed carrying idlers or other supporting surface.

2.165 **Trunk Conveyor** — A main road conveyor which transports mineral from one or more gate conveyors to a main loading point, to the shaft or to the surface.

2.166 **Tub** — *See* Mine Tub (Tub).

2.167 **Tub Stop** — *See* Car Stop (Tub Stop).

2.168 **Turnout** — An arrangement by which one track (pair of rails) is caused to diverge into two separate tracks.

2.169 **Turntable** — A mechanical device which assists in turning a mine car through an arc of a circle.

2.170 **Underground Mine Conveyor** — Sectional conveyors, usually of the troughed belt type, capable of being lengthened or shortened as mining operations advance or retreat, all as contrasted to above ground conveyors having fixed lengths for reasonably permanent installations. According to location in the mine or usage, they may be known as face, room, gathering, main haulage or intermediate haulage conveyors.

2.171 **Under-Rope Endless Haulage** — A form of endless rope haulage in which the wire rope runs between the floor and the axle3 of the tubs [*see* Haulage (Rope) and Fig. 7].

2.172 **Warwick** — A safety device, used on inclined haulage roads, consisting of a long bar pivoted from the roof which is caused to fall or lie in the path of a runaway vehicle.

2.173 **Weightometer** — *See* Belt Weigher (Weightometer, Conveyor Scale).

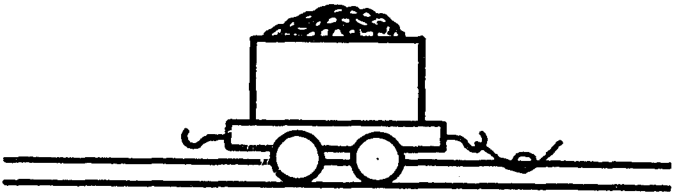


FIG. 7 UNDER-ROPE ENDLESS HULAGE

ANNEX A

(*Foreword*)

COMMITTEE COMPOSITION

Mining Techniques and Equipment Sectional Committee, MED 8

Organization	*Representative(s)*
Directorate General of Mines Safety, Dhanbad	Shri J. P. Kashyap (*Chairman*) Shri Mukherjee (*Alternate*)
Andhra Pradesh Heavy Machinery & Engineering Ltd, Vijaywada	Shri Tripuraneni T. Rao Shri Yelisetti S. Kumar (*Alternate*)
Bharat Coking Coal Ltd, Dhanbad	Shri Ramji Sahay
Bharat Earth Movers Ltd, Bangalore	Shri V. R. S. Prasada Rao Shri KY Venkatesh K. (*Alternate*)
Central Coalfields Ltd, Ranchi	Shri D. Singh Shri A. N. Jha (*Alternate*)
Central Mechanical Engineering Research Institute, Durgapur	Shri P. K. Sen Shri Maw Nandi Sarkar (*Alternate*)
Central Mine Planning and Design Institute Ltd, Ranchi	Shri S. K. Chaterji Shri U. Roy (*Alternate*)
Central Mining Research Institute, Durgapur	Shri A. K. Ghosh Shri S. K. Ritolia (*Alternate*)
Eastern Coalfields Limited, Sanctoria	Shri S. Chatterjee Shri C. B. Sahay (*Alternate*)
Eimco Elecon (India) Ltd, Vallabh Vidyanagar	Shri A. M. Deshpande Shri Ravindra Luthra (*Alternate*)
Gujarat Mineral Development Corporation, Ahmedabad	Shri S. N. Mathur Shri A. L. Thakore (*Alternate*)
Hindalco Industries Ltd, Dist Sonbhadra	Shri K. K. Dave Shri B. K. Jha (*Alternate*)
Hindustan Copper Ltd, Kolkata	Shri R. C. Singla Shri P. K. Sharma (*Alternate*)
Hindustan Zinc Limited, Udaipur	Shri B. V. Rao
Indian Chain Pvt Ltd, Kolkata	Shri Pradip Chitlangia Shri Lalit Mohan (*Alternate*)
Kapur Mining Equipment Private Ltd, Asansol	Shri Dipak Kapur Shri Tapan Dutta (*Alternate*)
Mahanadi Coalfields Limited, Dist Sambalpur	Shri S. K. Muraka Shri A. K. Ghosh (*Alternate*)
Manganese Ore (India) Ltd, Nagpur	Shri C. P. N. Pathak Shri G. Wangneo (*Alternate*)
Mecon Ltd, Ranchi	Shri H. C. Mishra Shri H. K. Bhanjdev (*Alternate*)
Nanda Millar Co, Kolkata	Shri J. P. Goenka Shri Pankan Goenka (*Alternate*)
National Aluminium Co Ltd, Bhubaneswar	Shri A. Chakraborty Shri M. M. Gantayat (*Alternate*)
National Mineral Devlopment Corporation Ltd, Hyderabad	Shri A. K. Gupta Shri A. K. Shukla (*Alternate*)
Neyveli Lignite Corporation Ltd, Neyveli	Shri V. Ravi Kumar
Simplex Engineering and Foundry Works Pvt Ltd, Bhilai	Shri P. G. Bhanderi Shri Mukesh Jain (*Alternate*)
South Eastern Coalfields Ltd, Bilaspur	Shri Kapil K. Rai Shri D. Bhattacharjee (*Alternate*)

Organization	*Representative(s)*
Tata Steel Ltd, Dhanbad	Shri Chavala Divaker Shri N. P. Singh (*Alternate*)
The Hutti Gold Mines Company Ltd, Dist Raichur	Dr M. L. Patil
The Singareni Collieries Co Ltd, Dist Khammam	Shri I. V. N. Prasada Rao Shri K. Hari (*Alternate*)
TRF Ltd, Jamshedpur	Shri C. B. Roy Shri N. C. Goswami (*Alternate*)
Western Coalfields Ltd, Nagpur	Shri G. L. N. Reddy Shri C. A. Venkateswarlu (*Alternate*)
BIS Directorate General	Shri C. K. Veda, Scientist F & Head (MED) [Representing Director General (*Ex-officio*)]

Member Secretary
Shri T. V. Singh
Scientist E (MED), BIS

GMGIPN—154 BIS/ND/08—300

Bureau of Indian Standards

BIS is a statutory institution established under the *Bureau of Indian Standards Act*, 1986 to promote harmonious development of the activities of standardization, marking and quality certification of goods and attending to connected matters in the country.

Copyright

BIS has the copyright of all its publications. No part of these publications may be reproduced in any form without the prior permission in writing of BIS. This does not preclude the free use, in the course of implementing the standard, of necessary details, such as symbols and sizes, type or grade designations. Enquiries relating to copyright be addressed to the Director (Publications), BIS.

Review of Indian Standards

Amendments are issued to standards as the need arises on the basis of comments. Standards are also reviewed periodically; a standard along with amendments is reaffirmed when such review indicates that no changes are needed; if the review indicates that changes are needed, it is taken up for revision. Users of Indian Standards should ascertain that they are in possession of the latest amendments or edition by referring to the latest issue of 'BIS Catalogue' and 'Standards : Monthly Additions'.

This Indian Standard has been developed from Doc: No. MED 08 (832).

Amendments Issued Since Publication

Amend No.	Date of Issue	Text Affected

BUREAU OF INDIAN STANDARDS

Headquarters :

Manak Bhavan, 9 Bahadur Shah Zafar Marg, New Delhi 110002
Telephones : 2323 0131, 2323 3375, 2323 9402

Telegrams : Manaksanstha
(Common to all offices)

Regional Offices :		Telephone
Central	Manak Bhavan, 9 Bahadur Shah Zafar Marg NEW DELHI 110002	2323 7617 2323 3841
Eastern	1/14 C.I.T. Scheme VII M, V. I. P. Road, Kankurgachi KOLKATA 700054	2337 8499, 2337 8561 2337 8626, 2337 9120
Northern	SCO 335-336, Sector 34-A, CHANDIGARH 160022	260 3843 260 9285
Southern	C.I.T. Campus, IV Cross Road, CHENNAI 600113	2254 1216, 2254 1442 2254 2519, 2254 2315
Western	Manakalaya, E9 MIDC, Marol, Andheri (East) MUMBAI 400093	2832 9295, 2832 7858 2832 7891, 2832 7892

Branches : AHMEDABAD. BANGALORE. BHOPAL. BHUBANESHWAR. COIMBATORE. FARIDABAD. GHAZIABAD. GUWAHATI. HYDERABAD. JAIPUR. KANPUR. LUCKNOW. NAGPUR. PARWANOO. PATNA. PUNE. RAJKOT. THIRUVANANTHAPURAM. VISAKHAPATNAM.